



to support EU eInclusion and eAccessibility

CVHI Tutorial 2006

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1 EXECUTIVE SUMMARY

The "*Conference on Vision and Hearing Technologies: State of the Art and New Challenges*" (CVHI) is a tutorial organised as a conference like event which invites students and young researchers to the field of AT and eInclusion. The main objective of CVHI tutorials is to offer young researchers attractive and high quality events to invite them to specialize and to work in this field. Experts from around Europe will work together with young researchers on up to date topics and problems. Students will submit papers beforehand, will work on the topics in co-operation with experienced international experts and will 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 specialities of eInclusion there is a need to help young researchers and practitioners to enter into international co-operation very soon in their career. CWST supports this attractive opportunity for highly skilled and motivated young researchers to learn from and co-operate with outstanding experts.

Young researchers get access and get to know an interesting and forward pushing field of R&D in an attractive environment. Working hands on with outstanding experts should help to determine and to initiate the new engineering, technological and fundamental science R&D required to resolve the most pressing problems in eInclusion. CVHI will also encourage the development of new R&D collaborations, encourage 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 06 are:

- The participation of 28 young and disabled researchers
- The provision of high level training in both assistive technology and conference participation, including chairing sessions, for the young researchers.
- A keynote panel discussion on Cochlear Implants and their Impact on the Deaf Community, in Austrian Sign Language and English (with interpretation).
- A keynote speeches on Electronic Travel Aids and Electronic Orientation Aids for Blind People
- Tutorial sessions on Sign Language Animation and Synthetic Signing; Public Transportation and Visually Impaired People; and Assistive Technology for Blind and Visually Impaired People: Modelling and Practical Issues
- Workshop on Wayfinding without Vision
- The opportunity for all conference attendees, particularly the blind and visually ones, to try three different mobility devices.
- The presentation of their current research projects by the young researchers.
- The organisation of a workshop on Advanced Learning Technologies for Disabled and Non-Disabled Learners at an IEEE Conference on Advanced Learning Technologies in Japan.

2 PREPARING THE TUTORIAL

The preparation of the tutorial started with first discussions between the University of Manchester, the University of Glasgow and the University of Linz.

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 Andreas Hofer in Kufstein. No deposit was required.

2.1.2 Registration, payment

The registration fee was deliberately kept low at 250 € for the conference event and 125 € for the tutorial day.

The late registrations fees were respectively 350 € and 175 €.

A registration form was available for downloading from the web site and payment 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 Budget Controlling, Use of the European Commission Funding

Budget Controlling 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**

28 young and disabled researchers were supported. Just under half, 12 of these researchers, were female and eight were disabled. Seven of the disabled researchers were under the age of 35 and one was over this age and supported as a disabled researcher. One of the female researchers was over the age of 35, but had taken a very extended career break. Taking this into account allowed her to be considered as a researcher at the start of her career. The young researchers were of 16 different nationalities and currently working in 15 different countries. They included one young researcher from outside Europe currently working in Europe and one young researcher working in another European country.

- **Invited Speakers**

Financial support was provided to the three tutorial presenters. Full travel and subsistence costs were provided to Dr. Hersh, who is also the conference organiser and Dr. Marston, since he did not have other possibilities of support and he was also involved in the keynote workshop and half travel and subsistence costs were provided to Dr. Glauert.

Financial support was also provided to the keynote lecture presenters. Half travel and subsistence costs were provided to Prof Farcy and full travel and subsistence costs were provided to Dr. Baumgartner. Dr. Thurner and Mr. Grobbauer did not have any costs. Dr. Guidice was fully funded as a young researcher.

- **Assistive Technology and Interpretation**

An interpreter was hired for the keynote panel discussion. The costs included travel expenses as well as payment. The cost of transporting an induction loop assistive listening system back to Linz from Kufstein were also covered. 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, the
- Registration desk
- Social programme
- Dr. Hersh's visit to investigate and determine an appropriate location for CVHI 06.
- Consumables and some administrative costs

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 WWW tools controlling 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
- Information on the conference bursaries and an application form.
- Registration information and an application form.
- Information about Kufstein and the conference hotel
- Accommodation reservation form
- Information about the conference social events.

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

2.1.6 Registration Desk

A registration desk was provided at the back of the conference hall. It was staffed by Ms. Vera Feichtenschlager 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.

2.1.7 Tutorial book, handouts

The tutorial book contained the three tutorials plus an additional paper about synthetic signing. 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.

2.1.8 Event and local information

CVHI 06 in Kufstein, Austria is the fourth event in the CVHI Conference Series and the first 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 this conference and the subsequent two conferences.

Kufstein is a historic city in the Austrian Tyrol, known as the 'pearl of the Tyrol'. It is situated on the River Inn close to the German border. Its 800-year old fortress is a major landmark and tourist attraction in the area.

Kufstein was a market town in the middle thirteenth century and acquired a protective wall and town status at the end of the fourteenth century. Relics of this ancient wall can still be seen in the Water Bastion and Water Tower.

As the presence of the fortress implies, Kufstein has not had a totally peaceful history. It was, for instance, a bone of contention between Bavaria and the Tyrol until it was conquered by the Habsburg emperor Maximilian I at the start of the sixteenth century.

Kufstein is also a good centre for cycling, walking and skiing, with the Kaiser Mountains to the east and the river Inn through the town. Another popular attraction is the riverside bars and cafes.

The Andreas Hofer Hotel is a four star hotel in the centre of Kufstein. 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.

2.1.9 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 Kufstein Festung and was a set menu with a vegan option.

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 room next to the conference room or outside on the terrace.

2.1.10 Special needs

Ms. Romanes contacted all conference participants in advance of the event to ensure that it was fully accessible and that any dietary or other needs were met.

An induction loop was installed. An Austrian sign language - English interpreter was hired for the panel discussion. 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.

Several blind young researchers were chairing sessions. They were provided with the programme in electronic format, so they could access it using a screen reader or Braille conversion software and a Braille display. During the meeting on chairing sessions their vice chairs were briefed on the need to alert them to audience members wishing to ask questions after the presentations.

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

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
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/pages/cvhi-06-kufstein-austria.php

2.3.2 Conference Tool

Reviewing, Notification, submission, registration, programme building was done on the basis of email exchange.

3 EVENT

CVHI 06 in Kufstein, Austria is the fourth event in the CVHI Conference Series and the first 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

- Champagne reception: Wednesday 19 evening
- Group Visit to Kristallwelten: Thursday 20 afternoon
- Banquet and Gala Evening in Kufstein Festung: Thursday 21 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 06. For the first time there was a civic champagne reception in the City Hall at the invitation of the Mayor of Kufstein. This took place on the second evening after the first day of regular paper sessions. The Mayor was unfortunately unable to be present and a representative welcomed the Conference on his behalf and spoke in German about the history of Kufstein and the Tyrol, with translation provided by Dr. Hersh. She thanked the City and Mayor on behalf of the Conference and spoke about the history of CVHI and the importance of assistive technology in both English and German.

The group visit to Swarovski Kristallwelten took place on the third afternoon, after the second morning of regular paper sessions. Kristallwelten is a well known Austrian tourist attraction and was the visit was very much enjoyed by everyone.

The tour guide and shop assistants were very helpful to the blind participants and allowed them to touch and handle a range of crystal objects.

The Gala Banquet at the Festung Kufstein was another CVHI first, as previous banquets have taken place in the conference hotel. The Festung provided an attractive and historic background for the banquet with a good view over the city.

3.2 Local arrangements

3.2.1 Rooms

The Conference took place in the Hotel Andreas Hofer in Kufstein. It is a four star hotel in the centre of Kufstein. 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 needed facilities were available.

3.3 Hotel reservation, booking

The facilities including accessibility have been checked by Marion Hersh beforehand. She also made reservations.

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.

After studying local information and train tables, the Innsbruck area was identified as meeting the location specifications. A number of hotels in this area were identified through internet searchers and with the help of Martin Morandell, a young researcher who is familiar with this area. A number of hotels were written to in German to ask about availability, prices and facilities including accessibility to disabled people.

The replies were then used to compile a short list of about six or seven hotels, the majority of which were situated in Innsbruck, one in Kufstein and two in villages outside Kufstein, to be visited. Excessive cost was a significant factor in excluding hotels at this stage. The selected hotels were then contacted to arrange a visit and to ask them to hold the rooms at the quoted price until about a week after the visit to enable Dr. Hersh to evaluate all the hotels and make a decision. The hotels were then visited in July 2005 and contacted soon afterwards with the decision.

3.4 Special needs support

Sign language, induction loop, Braille print, personal support have been made available of request.

3.5 Evaluation, Quality Control

No formal evaluation was done. Positive feedback was given by participants and experts taking part in CVHI 06.

4 SCIENTIFIC REPORT

4.1 Proceedings

Proceeding of the papers and presentations of CVHI 2006 will be made available via the conference web page.

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 well-known 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 '06 was the fourth 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.

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 are generally speakers.
- Regular paper sessions in a single track format.
- Group social events. They are an important opportunity for networking between participants.
- Meeting on charring 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 Sign Language Animation and Synthetic Signing

This was presented by Prof John Glauert, who is a professor and former dean of the School of Computing Science at the University of East Anglia, England. He is currently applying his computing expertise to the development of avatar technology to support sign language communication.

He has participated in two research projects in this area funded by the European Fifth Framework Information Society Technologies (IST) Programme. These are the ViSiCAST (Virtual Signing: Capture, Animation, Storage and Transmission, 2000-2002) and eSign (Essential Sign Language Information on Government Networks) Projects.

The tutorial covered the following topics

- The need for sign language access to speech and text. This included background information on deafness and the role of sign language animation and synthetic signing in supporting service provision to deaf people. It also covered the role of virtual signing and the relative advantages and disadvantages of interpreters, virtual signing and videos of signing, as well as the difference between natural sign languages such as British Sign Language and Sign Supported English.
- Technologies and challenges. This included the challenges of capturing, recognising and animating the gestures associated with signing, as well as providing appropriate grammar and semantics. The technologies used for data and motion capture were also discussed. The problems associated with good animation were also considered.
- Visicast and eSign projects. The ViSiCAST Project aimed to develop virtual signing to provide improved access to information and services for deaf people through their preferred medium of sign language. The outcomes presented included more accurate sign capture, the development of a weather forecasting application and the Tessa Avatar which was used in a post office application. The outcomes of the eSign project presented included an avatar player for use in applications and tools for lexicon creation and content assembly. The important role of deaf organisations in providing a bridge between the project partners and deaf end-users was also discussed.
- Applications: This included the use of virtual signers in television set-top boxes, the addition of signing services to multimedia and the internet, signed weather forecasts and face-to-face transactions in post offices, advice services and shops. In the face-to-face applications the aim would be the recognition and translation of a number of simple spoken phrases, rather than more complex communication and limited sign language recognition in the other direction.

4.3.2 Public Transportation and Visually Impaired People: a participatory tutorial

Dr. James Marston is a visually impaired researcher at the University of California in Santa Barbara USA, who exclusively uses public transportation for travel. His training as a geographer and personal experiences in travelling as a visually impaired person have motivated his interest in the problems encountered by blind and visually impaired people who want to access the urban environment and use public transport systems.

The tutorial covered the following topics:

- Barriers to accessibility: These include physical, functional and informational barriers. Since most important travel information is visual and layouts are spatial, informational barriers are a particular problem for blind people. The problems resulting from missing visual cues were discussed.
- Identification of issues: The results of field surveys of visually impaired people and their use of public transport were reported. This included the fact that visually impaired people make many fewer trips than sighted people and less than half of them use public transport.
- Practical illustrations of the use of assistive technology: the use of talking signs and RIAS was illustrated on video clips, as well as a talking signs receiver combined with an electronic compass. Survey data on the use of RIAS in travel was presented. It was

shown to lead to a significant improvement in both performance and the enjoyment of travel, with reductions in stress.

- A particularly significant factor was the cognitive processing strategies: surveys were used to investigate the cognitive strategies used by visually impaired and blind people and whether there were any differences from the strategies used by sighted people. The cognitive load on the use from different types of assistive devices was considered.
- Relative access measure: This is used to quantify the effort penalty i.e. additional time or distance that structural barriers imposed on wheelchair users. This measure was also applied to visually impaired people using their normal travel strategies in different situations. A combination of this approach with qualitative data was used to identify barriers.
- Environmental cues: The need for different types of environmental cues was discussed. The type of surfaces that could be detected under foot and by a cane was considered. The provision of alignment information and indications of the best crossing points for blind and visually impaired people were also discussed.
- Indoor and outdoor navigation: The use of global positioning systems and maps optimised for tactile readability were considered and their advantages relative to earlier technology was discussed. Indoor navigation aids, including laser range finders, talking Braille signs and talking lights were considered.

One of the distinctive features of this tutorial was the large number of video clips of blind and visually impaired people using different types of assistive technology, including talking signs, to get around different public areas.

4.3.3 Assistive Technology for Blind and Visually Impaired People: Modelling and Practical Issues

Dr. Marion Hersh is a senior lecturer at the University of Glasgow in Scotland. In addition to being the CVHI conference organiser and chair, she has co-authored two books on assistive technology. Together with her students she has developed a number of assistive systems for people with sensory impairments.

The tutorial covered the following topics:

- The role of modelling and the Comprehensive Assistive Technology (CAT) model.
- Modelling and end-user requirements: This covered the importance of end-user involvement from the start of a research and development project, issues relating to working with disabled end-users, disability equality and awareness training and the importance of ensuring that full communication and participation of disabled end-users. The social and medical models of disability were presented and end-user requirements related to the social model.
- Overview of existing approaches to modelling: This included an overview of the measurement of assistive technology outcomes, two approaches to defining quality of life for disabled people using assistive technology and the use of (health related) quality of life as an outcome measure. A number of approaches to measuring quality of life using assistive technology were presented, including matching person and technology.
- Modelling assistive technology systems: The definitions of assistive technology were discussed, since the modelling process will depend on the definition used. The objectives for an assistive technology modelling framework were then presented. Existing approaches were reviewed and shown to comprise two main categories, neither of which met all the requirements for a modelling framework. The problems with existing approaches to modelling human activities were considered and specifications for an improved classification scheme presented.

- The Comprehensive Assistive Technology (CAT) Model: The modelling approach was discussed and the model was then presented. It has a hierarchical branching structure with four main components at the first level. A graphical representation of the model was presented. It was noted that this graphical approach was convenient for sighted researchers, but that the model could also be described using text.
- Applications of the model: The different types of applications of the model were discussed. This includes determining gaps in assistive technology provision, analysing existing assistive technology systems and designing new assistive technology systems. Examples of an ultrasonic cane, an accessible lift and communication for deafblind people were presented.

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 filling in some of the questionnaires used in the matching person and technology assessment process. This gave participants insight into what is involved in the assessment process. It also provided a useful change of pace in the tutorial session.

4.4 Keynotes

4.4.1 Electronic Travel Aids and Electronic Orientation Aids for Blind People: Technical, Rehabilitation and Everyday life Points of View

This paper, written jointly with his colleagues Roger Leroux, Alain Jucha, Roland Damaschini, Colette Grégoire and Aziz Zogaghi, was presented by Prof. René Farcy of the Université Paris Sud in France. He and his colleagues have developed two electronic travel aids, the Tom Pouce and the Télétact, which have been in use for seven years and a global positioning system with inertial sensors, the Géotact.

A particularly interesting aspect of the presentation was an overview of the training in using the two mobility and one orientation devices developed by his group. Another innovative feature was the presentation of their system for evaluating successful mobility (using the devices).

The presentation was divided into the following three main parts:

1. Discussion of the technical and other features of the three travel aids developed by the group. The Tom Pouce is an infrared device which is able to detect obstacles in front of the user, as well as obstacles that cannot be detected by the long cane. The user is alerted to the presence of obstacles by vibration and the detection distance can be adjusted. The Tom Pouce technical specifications can be compared with those of the Ultracane, Miniguide and bat K sensor. The Teletact uses a laser beam to detect obstacles and communicates to the user with either a tactile or audio interface. The tactile interface consists of two vibrators on two different fingers and can indicate the presence of obstacles in three distance ranges up to six metres. The audio interface gives distance information for 28 distance ranges up to 15 metres using musical notes. A combination of the musical notes and information from proprioception provides the user with information about the shape of the obstacle and the position of the user's body relative to it. The Geotact is a GPS sensor with inertial sensors used to reduce the degradation of information where there are high buildings. It provides information only

when requested by the user and leaves the choice of routes between two points to the user to encourage the development and use of locomotion skills.

2. Training in the use of the travel aids: The requirements for and aims of training were discussed. First the end-user prerequisites for using an electronic travel aid, including the ability to using a long cane, analyse audio information and motivation, were considered. Then the training courses in using the two mobility aids were discussed. The aims of the training and the structured approach, starting with the Tom Pouce in quiet places, moving to crowded areas, and then graduating to the Teletact, used to achieve them were presented. Issues relating to the integration of information from the assistive device with other sensory information were considered. The transition between the two devices were discussed, as well as the problems in using the increased amount of information provided by the Teletact. This involves developing the ability to imagine the location of the obstacle detected by the device and the exercises developed to facilitate this were presented. Training in the use of the Geotact is less well developed. Problems in choosing routes which were safe were considered
3. Objective measurement of mobility: The requirement to be able to do this in order to evaluate the improvement in skills and provide the user with feedback was discussed, as well as the conditions to be satisfied by the approach. This led to a discussion of what was meant by good mobility in order to develop a scale of mobility quality, and comparison of the mobility of disabled with a non-disabled or blind with a sighted person. The use of points to represent the degree of difficulty of a particular route was presented and a number of examples of routes were given. The scoring system was described and the comparison of the performance of blind people to that of sighted people using this scoring system was discussed.

4.4.2 Wayfinding Without Vision Workshop

The workshop was presented by Dr. Nick Guidice and Dr. James Marston, both of the University of California Santa Barbara.

This workshop comprised two main parts:

1. A presentation of an interface that can be used in wayfinding indoors: The paper focused on the development of a verbal interface for presenting information on the layout of indoor environments. The lack of research on indoor navigation aids and the unsuitability of global positioning systems for indoors use was noted. This was followed by a discussion of differences in spatial performance of blind and sighted people and suggested to be based on a lack of information rather than limited spatial abilities. This led to discussion of the issues involved in presenting verbal directions for route navigation and the need for a standard order and syntax to enable consistent unambiguous messages to be conveyed. Two experiments in providing verbal navigation information to blind and visually impaired people were presented and their results discussed. It was noted that there were no significant differences between the performance of totally blind and low vision participants and that training in real and virtual environments led to very similar results in training, but not in the experiments. The presenters concluded that the experiments were the first to study the use of dynamically updated verbal descriptions to support wayfinding behaviour in large scale indoor layouts. The need for further research was also noted.
2. A practical demonstration of the Sendero BrailleNote GPS device. This was used to guide Dr. Guidice, who is blind, round the hotel and back to it, providing information on the way. He was followed by a large group of conference delegates and everyone managed to return to the hotel without mishap. The practical demonstration provided the sighted delegates in particular with insight into some of the issues involved in orientation for blind people and how assistive devices can be used to support it.

4.4.3 Cochlear Implants and Their Impacts on the Deaf Community

This keynote panel discussion in Austrian Sign Language and English with interpretation was a first for CVHI (and possibly for technical conferences). The three panellists, Mr. Reinhard Grobbauer from the Austrian Deaf Federation, Dr. Erwald Thurner from Med-EI (Medical Electronics) and Dr. Wolf-Dieter Baumgartner from the University Clinic in Vienna were chosen to provide three different perspectives on this subject, that of the Deaf community, the medical perspective and that of electronic engineering. The discussion started with a presentation by Dr. Baumgartner on medical issues relating to the use of cochlea implants. This was followed by Dr. Thurner's overview of the technology involved in cochlea implants. Mr. Grobbauer finished the first part of the panel with a discussion of both positive and negative experiences of young people and their families, as well as the resulting identity problems that were sometimes experienced with the implanted person feeling that they belonged to neither the Deaf nor the hearing communities. The three panellists treated this very controversial subject with great sensitivity.

The panel presentations were followed by a very lively and wide ranging question and answer session with the audience. It cover the full range of technical and end-user issues, including the relationship between the deaf and cochlear implant communities and if time had allowed could have continued much longer. The panel ended with brief final comments from the three panellists.

In addition to discussion of an important assistive technology area, the panel had a tutorial role in increasing awareness of amongst participants, particularly young researchers, of sign language as a communications medium which could be used for the expression of complex ideas. The session was very ably interpreted by Elizabeth Greil and this high quality of interpretation contributed to the overall success of the session.

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 Communication Technologies for Deaf and Hearing Impaired People

This session comprised four papers:

- Measuring sign language comprehension through spatial response: This multi-authored paper from the Department of Computing and Goldsmiths College in London was presented by Ms. Saduf Naqvi, a PhD student in this department. It discussed a series of experiments on the use of a spatial measuring interface based on an equilateral triangle to explore sign language comprehension.

- Consuming disability – a new Dutch system for hearing aid distribution: Ms. Irene Olausen, a doctoral research fellow at the Centre for Technology, Innovation and Culture and the University of Oslo discussed the deregulation of the Dutch system of hearing aid distribution. She used a corporate discourse on disability to discuss the views of hearing impaired people obtained from an ethnographic study in the Netherlands.
- Enhancement of telephone situations for hearing impaired: This multi-authored paper was presented by Mr. Jan Krebber, a research assistant in the Institute of Acoustics and Speech Communication at Dresden University of Technology. He spoke about the impact on hearing impaired people of different types of disturbances on telephone lines. The results of tests in two languages with four different listener groups were presented.
- Spectro-temporal receptive fields simulated by independent component analysis: This multi-authored paper from the Centre for Applied Hearing Research at the Technical University of Denmark was presented by Mr. Thorsteinn Arinbjarnarson, an MSc student there. He discussed the biological features of auditory signal processing and the determination of an auditory spatiotemporal receptive field using reverse correlation methods when the activation signal pattern of the neuron is known.

4.5.2 Physiological and Modelling Issues in Developing Assistive Technology for Blind People

This session comprised two standard papers and a survey paper:

- Audio-visual brain activity recordings and McGurk illusions: This paper by two authors from the Centre of Applied Hearing Research at the Technical University of Denmark was presented by Mr. Sylvain Favrot, a PhD student there. The paper presents a preliminary study of the brain responses to audio-visual speech stimuli using electroencephalographic measurements to evaluate the contribution of the visual modality to auditory perception.
- A new generation of visual assistance for the partially sighted: a clinical study. This multi-authored paper was presented by Anne-Catherine Scherlen, a PhD student at the Ecole Nationale d'Ingénierie de St-Etienne. The paper presents a clinical evaluation of the ViSAR device for Visual Signal Adaptive Restitution which adapts visual signals to reduce visual discomfort.
- Visual Prostheses: Prof Hans-Heinrich Bothe of the Centre for Applied Hearing Research at the Technical University of Denmark presented an overview of the state of the art on the use of visual prostheses to restore some degree of visual to profoundly blind people. The extended presentation included a discussion of different modes of insertion of the prosthesis, technical details of existing systems and prototypes and an evaluation of the current state of the art.

4.5.3 Assistive Technology, Education, Training and Accessibility

This session comprised four papers:

- Supporting the Development of basic skills of people with multiple impairments by training and new technologies. This multi-authored paper was presented by Ms. Marina Muscan of the League for the Defence of the Disabled People's Rights in Romania. The paper discusses a new approach to teaching disabled people which is aimed at to overcome the barrier to learning posed by lack of self-confidence, as well as the poor quality educational provision available to many disabled people.

- Study of accessibility characteristics of academic websites: This multi-authored paper was presented by Mr. Manuel Rivas-Perez a PhD student in the Departamento de Arquitectura y Tecnología de Computadores of the Universidad de Sevilla. The first part uses the World Wide Web Consortium accessibility guidelines to derive accessibility features for an academic website. The second part analyses usability features of these web sites in the context of accessibility.
- e-Learning – a challenge for the disabled people in Estonia: This jointly written paper was presented by Mr. Erik Loide and Ms. Ülle Lepp from the Estonian Foundation for the Visually Impaired. It describes a case study of the Estonian experience of developing e-learning courses at the university level and including disabled people into the e-learning process. The case study is then used to draw general conclusions and make recommendations about accessibility of e-learning.
- Making education, home and work environment more accessible and using assistive technology sufficient for sensory impaired students of higher education: this multi-authored paper from the Department of Instrumental and Biomedical Engineering was presented by Ms. Zlatic Dolna, a PhD student there. The paper discusses the use of accessible assistive technologies to support the higher education of visually impaired students at Kosice TU.

4.5.4 Orientation and Mobility Technology for Blind People

This session comprised five papers:

- The UltraCane mobility aid at work from training programmes to case studies: Prof. Brain Hoyle from the Institute of Integration Information Systems at the University of Leeds presented this two author paper. He provided an overview of the development of the UltraCane and the technology used, with a particular focus on the participation of prospective visually impaired end users.
- A haptic mouse used for reading of virtual maps: Mr. Imre Juhasz, a research associate at the Department of Psychology at Uppsala University spoke about the use of tactile mice by blind and visually impaired people to navigate virtual tactile maps. He discussed three experiments which investigated this application.
- Navigation training tool for the visually impaired: Dr. Nikolakis from the Informatics and Telematics Institute at Themi-Thessaloniki presented this multi-authored paper. He presented a mixed reality cane simulation prototype to allow blind people to navigate virtual worlds. The application is based on a combination of a real cane with a haptic feedback system.
- Development of auditory orientation training system for the blind by using 3-D sound: Dr. Yoshiku Seki from the National Institute of Advanced Industrial Science and Technology in Ibaraki presented this two author paper. He reported the development of a new auditory orientation training system. The system used three dimensional technology to reproduce sounds reflection and/or insulation in addition to the original sound source and provides training in both sound location and obstacle perception.
- Experimental evaluation of a new touch stimulating interface dedicated to information display for the visually impaired: This multi-authored paper from the Laboratoire de Robotique de Paris of the Université de Marie Curie-Paris 6 was presented by Ms. Eleanor Fontaine, a PhD student there. She presented experimental results of blindfolded users' touch perception and tactile acuity when using a touch stimulating interface. The prototype touch stimulating interface used shape memory alloy technology.

4.5.5 Accessibility of Documents and Multimedia

This session comprises four papers:

- Accessibility and usability in electronic texts - what does it mean?: Dr. Barbara Leporini, a post-doctoral researcher at ISTI – C.N.R. in Pisa spoke about the project STELAE, Science and Technology for Accessible Electronic Books. Its main aim is creating books on cultural and scientific issues that are accessible and easy to use. She also presented her own original model for including specific elements linked to different reading typologies.
- Accessible multimedia messaging services: This multi-authored paper was presented by Mr. Thorsten Völkel, a PhD student at the Human-Centred Interfaces Research Group at the University of Kiel. He spoke about accessibility issues in multimedia messaging services and argued that personalisation based for media arrangements for specific user groups is required. He also presented a general architecture for the runtime personalisation of these services.
- Making electronic forms accessible: design of teaching materials: Ms. Mintwab Yemane, an MSc student, presented this multi-authored paper from the International Graduate School of Digital Media and Management at the Multimedia Campus Kiel. She presented the findings of a computers based training project carried out by a group of students. Materials were developed for on-line training platform to teach web designers about accessibility, including of on-line forms for visually impaired people.
- EUAIN: Integrating accessibility with mainstream document processing: Mr. Neil McKenzie, a young research at DEDICON International Projects Department presented this multi-authored paper. The paper built on existing work in the area of accessible content processing and aimed to establish overlaps with current practice in the workflows and supply chains used by different branches of the publishing industry to enable accessibility to be included further back in the information processing chain.

4.5.6 Accessible Design and End-User Involvement

This session comprised four papers:

- The multi-level benefits of accessible design: expanding the view from “accessibility for people with disabilities” to “accessibility for everyone”: Ms. Angela Engel, an MSc student at Integriert Studieren at Johannes Kepler University discussed some of the reasons why accessible design technique are still only applied to a small percentage of online materials despite several well-known accessibility initiatives. The paper tries to dispel myths about the high costs and low benefits of accessible design and show that it benefits a large user group.
- The virtual guide dog 2006 – from an idea to a product for the visually impaired: Ms. Gudrun Heinzlreiter-Wallner, a research associate, presented this multi-authored paper from the Department of Medical Software Engineering at the Upper Austria University of Applied Sciences. She spoke about the used of interfaces, colour or shape coded graphical user interface elements to enable visually impaired and blind people to interact with computers. She discussed the development and ongoing testing by visually impaired people of a software system for mobile devices, resulting in the VIRTUAL GUIDE DOG product.
- Ambient intelligence and older people: the open design for all approach: Mr. Angel Jimenez Fernandez, a PhD student presented this multi-authored paper from the Dipartamento de Arquitectura y Tecnologia de Computadores at the Universidad de Sevilla. He discussed the applications of the ambient intelligence computational paradigm

to the integration of disabled people, as well as the possibility of these technologies widening the accessibility gap. A scenario proposed by the Information Society Technologies Advisory Group is studied to examine accessibility barriers and possible solutions.

- Science, technology, engineering and mathematics: providing multimodal access for blind people: Dr. Dónal Fitzpatrick, a faculty member at the School of Computing, Dublin City University proposed methodologies for depicting visually complex data in a non-visual manner. He showed how the prosodic component of spoken language and lexical cues can be used to reduce ambiguity and how these modalities can be combined with Braille.

4.5.7 Modelling, Interfaces and Design for All

This session comprised four papers:

- Assistive technology and design for all: Ms. Lisa Ehrenstraaser, a young researcher, presented this two-authored paper from the Biomedical Engineering, Rehabilitation and Inclusion Research Group of ARC Seibersdorf Research GmbH. She discussed the difference between the approaches of inclusive and universal design, questioned the usefulness of these methods across a broad range of professions and presented the need for an interdisciplinary discourse, particularly in the area of assistive technology.
- The need for a specific user interface for people with Alzheimer's disease – can an avatar based GUI be a solution: Mr. Martin Morandell, a diploma student from the Department of Rehabilitation and Inclusion at ARC Research GmbH spoke about the design of user interfaces for people with dementia of the 'Alzheimer's type and the challenges created by the progress nature of this disease. He presented an avatar based user interface for an assistive home environment.
- A standard method of profiling the accessibility needs of computer users with vision and hearing impairments: Mr. David Fourney, an MSc student, presented this two authored paper from the Department of Computer Science at the University of Saskatchewan. He presented the concept of a common accessibility profile for identifying and dealing with accessibility issues in a standardised manner across multiple platforms. These profiles can be used to evaluate the potential of particular systems to meet the needs of an individual user or group of users.
- On modelling assistive technology systems: Dr. Hersh from the University of Glasgow and the conference organiser decided not to present this paper to give more time for the young researcher's feedback meeting, since an extended version of the material had been presented in one of the tutorial sessions.

4.6 Meetings for Young Researchers

4.6.1 Meeting on Chairing 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 of the regular paper sessions 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.

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 chair sessions. It started with a brief presentation by Dr. Hersh on what successful chairing involved 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. At CVHI 07 this meeting will be extended to cover presentation skills.

A number of the young researcher chairs are blind and used an electronic version of the conference programme with either a screen reader or Braille output. The support they required from their co-chairs, particularly in alerting them 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 06 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 07.

A hearing impaired young researcher noted that due to his impairment he found listening to presentations all day very tiring and suggested that the conference presentations end much earlier. Making CVHI conferences fully accessible to hearing impaired participants is very important. Unfortunately the suggested solution of shortening the conference day is not really workable, as it would require either a move to parallel sessions which would negatively impact on the conference outcomes or require an additional day, which is undesirable on the grounds of both cost and the time involved.

4.7 Other Contributions

Prof Farcy had brought the Tom Pouce and Teletact mobility aids and Prof Hoyle had brought the Ultracane, giving blind delegates the opportunity to try out three different devices. Several of them took advantage of the opportunity and seemed to enjoy it. However, no attempt was made to obtain feedback from them on the relative performance or satisfaction with the different devices and the time available would have been rather short for a meaningful comparison.

In addition to the benefits to participants CVHI 06 has had a number of concrete outcomes, of which Dr. Hersh is aware of the following:

- The organisation of a workshop on Advanced Learning Technologies for Disabled and Non-Disabled People at the 7th IEEE International Conference on Advanced Learning Technologies in Niigata, Japan. This is a well-known and respected conference on learning technologies and it is the first time that it has considered learning technologies for disabled people.
- An idea for a project proposal in the area of captioning for Deaf people and involving the Universities of Glasgow and London.
- A co-authored paper by several of the young researchers.

Several of the young researchers have published short articles on CVHI 06.

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.

6 Acknowledgements

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, the CVHI 2006 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 Mr. Martin Morandell who has been responsible for the local organisation, including the group visit and banquet, to Dr. Barbara Leporini who has contributed her expertise to create and design an accessible and beautiful CD of the conference proceedings and Ms. Vera Feichtenschlager 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. And also the staff at the Hotel Andreas-Hofer who have helped smooth the way to successful arrangements for the event.

7 Event Evaluation Form

Please find enclosed.

EVENT NAME AND TOPIC: CVHI 2006 Conference and Workshop on Assistive Technologies for Vision and Hearing Impairment
Technology for Inclusion

