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A Note from the Editor

Dear SIGACCESS member:

Welcome to the new look of the online edition of the SIGACCESS Newsletter – with new layout, the use of sans-serif and larger font throughout, left-justification, and the inclusion of authors' short biographies and photographs (so that you can say hi when you meet them in meetings and conference).

This issue aimed at introducing research projects and initiatives in promoting and facilitating accessible computing in Europe. The articles in this issue came from Czech Republic, England, Germany, and Scotland.

Finally, the call for participation for ASSETS 2007 is included. Join us in Tempe, Arizona this year.

Sri Kurniawan

Newsletter editor

Inside This Issue

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Finally, you may publish your work here before submitting it elsewhere. We are a very informal forum for sharing ideas with others who have common interests.

Anyone interested in editing a special issue on an appropriate topic should contact the editor.

Online social support for older people

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Introduction

Until a few years ago, the main activities of internet users were all about accessing information and data. These days, the internet is increasingly used for social interaction and communication purposes. This topic becomes ever more important with the growing popularity of virtual environments, social networking websites and their likes. The fact that more and more people use online communities for social interaction opens new challenges for inclusive design researchers and practitioners. In addition to making information accessible to people with special needs, it is also necessary to ensure that everybody has access to the social aspects of online activities.

This article specifically focuses on the user group of older people. Although a lot of effort has been put into making the internet accessible for older people, little has been done regarding the investigation and inclusion of older people in social interactions online. Is it enough to make sure that older people can read and understand information on websites? Doesn't the internet provide more than information? And are we doing enough to ensure that the social aspects of the internet are accessible to older users as well?

We need to explore the opportunities and challenges of information and communication technologies as a tool to support older people in their daily life. One aspect of this is the exchange of social support among older people in online communities. Apart from possible benefits and opportunities for social connections, it is also necessary to assess the challenges and restrictions of computer-mediated communication when it comes to the facilitation of social support.

This topic has a significant contribution to inclusive design as it gives insights into the versatile characteristics of online communication. The results of studies in this area shed light on the patterns of social support exchanged among older people in online communities as opposed to their offline communities. If we understand the aspects of online social support and how it is exchanged by older people in online communications, we can also find ways to nurture it and design online communities to better facilitate supportive communication.

Older people and the internet

In recent years, the interest in the role and well-being of older people in today's society has become a centre of attention for researchers from different academic fields. This is mainly due to the constant increase of the percentage of older people in today's society. Currently, 16% of the population in Britain are 60 years or older [8].

As the number of older people is increasing, more and more people aged 65 and above are going online. Between 2000 and 2004 the degree of internet usage by people aged 65 and older has increased by 47%. Currently, 22% of American older people use the internet and this figure is estimated to continue growing [6]. Similar numbers can be found in Britain, as 28% of older British people go online [9]. However, the percentage of people of 60+ years that use a computer is still much lower than the number of computer-users in the other age-groups. This gap between the age-groups is even larger when it comes to internet-usage [9]. The UK

government has therefore committed to the aim to fill the gap in internet usage for groups that are at risk of exclusion. This includes the aim to educate and encourage older people to become active online. This is also vital for their inclusion in today's society, as many activities like voting, reading news, and learning are increasingly being offered online [2].

A lot of work has been done to establish guidelines and standards to make the internet accessible for older people (e.g. [7]). The increasing awareness and popularity manifests itself in a trend towards providing a more universal web design, which makes it easier for older people to access and retrieve information from the internet.

Up to now, scholars that investigated the internet usage of older people were mainly concerned with the accessibility of the internet for older people and how age-related changes (e.g. decline of vision and motor abilities) affect older people's use of computers. In order to resolve barriers to the accessibility for older people, HCI researchers and practitioners have developed physical and software interfaces that accommodate for special needs of older people and have developed assistive technologies that help older people access information on the internet (e.g. screen readers).

But it is not only the fact whether older people have access to computer technology or not, it is also the differences in people's activities online that contribute to the *digital divide*. DiMaggio et al. [4] describe the *digital divide* as "inequalities in access to the Internet, extent of use, knowledge of search strategies, quality of technical connections and social support, ability to evaluate the quality of information, and diversity of uses" (p.7). It is therefore important, that not only access to computers and the internet is ensured for older people, but also that it offers the possibility for older people to perform all the activities they want to perform. This also includes social interaction and communication online [16].

Online social interaction for older people

Only few studies have so far investigated online communication and online community-building for older people (e.g. [10, 14, 15, 17, 18]). Wright [15] investigated messages from discussion boards within SeniorNet, an online community for older people. He was particularly interested in the exchange of social support. He found that three major topics in the online community were a) to express the value of the community, b) to give advice based on one's own experiences and c) to share one's life experiences with other members in the online community. Both, informational and emotional support was valued by members of the online community [15]. Furthermore, he found that the more time older people spend in online communities, the larger is the number of people they are in contact with and the higher is their satisfaction with their received support [14].

Older people are not only receivers of support, but have also much to offer. Tinker [12] states that the capacity of support that older people can give is often overlooked and not recognised sufficiently. Studies found that online communities for people that experience a similar life situation are usually characterised to be very supportive and emotional [11]. Given the fact that older people share similar experiences like e.g. retirement, it is believed that online communities for older people have the potential to be a place of support and understanding. Online communities for older people could therefore provide a space and place where older people can not only receive support but also provide support. Studies showed that older people show a higher perceived well-being when they have more social interactions [3]. Also, regular computer usage has been shown to animate older people to higher levels of social activity and mental fitness [5]. Participation in empathic online communities is therefore believed to help preventing isolation and to improve the quality of older people's lives.

The following section describes briefly a code scheme for analysing social interactions within online communities for older people. It provides guidance for sorting the text chunks of discussion board messages into codes, according to the content of the text. This code scheme was developed in order to study empathic social interactions of older people in online communities. Coding the messages distils the meaning of the messages and the characteristics of a conversation from the raw text. Special emphasis is placed on the characteristics of social support in the messages from these online communities where older people with similar interests meet and exchange their experiences. Especially when it comes to situations that older people are more likely to experience than younger people (e.g. age – related illnesses), the exchange of experiences and coping strategies can have an empowering influence on the quality of life for older people.

A code scheme for the analysis of online social support

In order to understand how older people exchange social support in online communities, I investigated messages of an online community for older people. Text chunks were assigned codes according to their content and intent. The use of such codes to describe the content of a conversation allows to describe and to compare different online conversations. A code scheme for social interaction of older people in online communities was developed. The online community of SeniorNet (www.seniornet.org) was investigated. SeniorNet is a non-profit organisation that provides computer- and internet-courses. Additionally to offline learning courses for older people, SeniorNet hosts a website that incorporates an online community existing of over 500 discussion boards that cover a variety of different topics. It therefore offers a place for older people to socially interact, talk about their interests, and build connections and friendships with other members. Due to its large size and vital activity within the online community, it has been the basis for various empirical studies about online communities for older people [13, 17, 10, 14, 15]. Figure 1 shows the SeniorNet homepage.

Figure 1 SeniorNet Homepage

Content analysis was applied to 1.200 messages from four discussion boards with the distinctive topics *Ageing issues*, *Back pain*, *Depression*, and *Word processing applications* within the online community of SeniorNet. Through the investigation of the four discussion boards, a code scheme consisting of 21 codes that were sorted into six high-level categories was developed and generalised. A focus group was conducted to discuss and solve existing problems and discrepancies in the code scheme. Results showed the robustness of the six high-level categories for investigating social interactions in an online community for older people. As a conclusion, the high-level categories are proposed as a valid categorisation

scheme in order to investigate empathy and social support in online communities for older people. Table 1 lists the categorisation-scheme.

Table 1: The code scheme

Light support • Light encouragement • Best wishes • Humour
Deep support • Questions in order to help • Advice • Support
Information/Facts • Factual information • Link to information • Factual questions
Community building • Thanks • Activity of others • Different channel • Appreciation of the DB • Own activity
Self-disclosure • Same situation • Narration • Emotional situation • Medical situation • Ask for help/experiences
Off-topic • Third person story • Chitchat

The Focus Group concluded that the six high-level categories are stable across all of the investigated discussion groups and could be used as an overall validated code scheme. When it comes to the more detailed codes, however, the differences of the social interactions within the investigated discussion boards were too big in order to be captured by a single code scheme. The focus group concluded in the following recommendation for using the code scheme in order to investigate social interactions of older people within an online discussion board:

The six high-level categories are an appropriate framework to describe for social interactions of older people in discussion board-driven online communities. They should be used as a first code scheme in order to sort the different messages and text chunks into one of the six main categories of contribution. However, the framework is only the first step in the investigation of the online communities. In order to investigate the characteristics of the categories in more

detail, the content of the categories needs to be analysed further. For example, one category is called *Self-disclosure* and includes text in which people talk about themselves. However, the way people talk about themselves was extremely different for every discussion boards, which makes it difficult to create sub-codes that fit for all discussion boards. It is therefore recommended, to have a closer look on the characteristics and nature of the categories for each of the investigated discussion boards in order to conduct a more detailed and specific analysis.

Summarising, the six categories have been validated to be a suitable framework for studying online discussion board communication by older people. However, it is recommended to analyse social interactions beyond the categorisation in order to investigate the characteristics and nuances of the content of each of the six categories.

Conclusion

The developed code scheme is a first step in analysing how older people exchange social support in online communities. Further studies are necessary in order to examine the differences between online social support and offline social support. Furthermore, studies that go beyond the content of the exchanged messages and also look at the development and maintenance of friendships that evolve in empathic online communities for older people are necessary in order to get a better understanding about social support in online communities. Different methodologies, like content analysis, virtual ethnography, social network analysis, and query-based techniques need to be applied in order to get a full picture of the nature and patterns of social interactions in empathic online communities for older people. Furthermore, it is important to listen to the experiences and opinions of the participants in these empathic online communities to elicit information about the differences, commonalities and also connections between online and offline social support and friendships. Interviews and questionnaires conducted with participants of empathic online communities are necessary in order to make valid conclusions.

It is important to investigate the social accessibility of online activities for older people as this will give insight into the drawbacks and opportunities of online communication for older people, especially when used as a means of supporting them in their daily life. By analysing in detail the patterns of social interaction in online communities for older people, we can identify the constituents of online social support and also investigate the network structure that is developed around it. Research in this area will give insights in how the accessibility of the social aspect of the internet can be improved for older people. This knowledge can be used in the analysis and evaluation of online support communities for older people and can also feed back into their design. Thus, understanding the needs and preferences of older people concerning online communication can contribute to a successful design of online communities for older people.

Additionally, similar investigations for other user groups with special needs are necessary to ensure accessibility to future activities on the internet for the widest possible user groups.

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Ulrike Pfeil started her PhD work in October, 2006, funded by a three-year, full-time doctoral research studentship from City University London. She was awarded an MSc in HCI from the same university in 2006 and a BSc in Information Design from the "Hochschule der Medien", Stuttgart, Germany in 2005. Her research interests include Social Aspects of Computing, especially in Computer-Mediated Communication. She specifically investigates the phenomenon of social support among older people, especially how social support changes in online environments compared to offline ones. Within City University, she is working at the Centre for HCI Design. The research area of the Centre is particularly focused around Requirements Engineering, E-learning, Computer-Supported Collaborative Work, Inclusive Design and Social Aspects of Computing.

An investigation into web accessibility standards as a practical study with older and disabled citizens

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To coincide with the growth of online services, website standards are progressing to evolve to maintain levels of consistency and usability amongst all web design. Another important aspect is also to include as many users and user groups as possible, especially older and disabled users, given the high potential benefits for those users from the online information, advices, and services. The changes brought about by standardising web design can be both large and small. Ideally the changes will be small enough to go unnoticed by users, but our aim was to see whether even the small changes can make reasonable differences for test users.

Early last year, a disabled relative of the first author approached him asking for assistance in getting online and to show him the fundamentals of web navigation. This person suffered heavily from Parkinson's disease, and the process of learning was, for him, both stressful and fraught with complications. This led to a decision to investigate ways in which web standards may assist this user, and those who suffer similar impairments within a similar age bracket. Through investigation and research we derived enough information to create an example website, based on certain criteria and ranking of users' needs, which was used to test certain principles and analyse their real-world effectiveness.

In this short article we describe the creation of a ranked table of needs, which reflect the needs of not only our target users but users who suffer different disabilities, and the results from a limited user-centred tests followed by a conclusion to our findings, including a discussion about the practicalities of standardisation and its effectiveness/usefulness.

Assisting web designers - Developing a set of prioritised users' needs and requirements

Due to the nature of web accessibility, it is improbable that designers can attain designs which adhere to all users issues. With the user-centred approach, it is suggested to rank the user needs and adapting designs to this accordingly. By following this methodology it is expected that the most common user requirements, of the largest number of users, will be addressed.

Table 1 depicts the table of needs of the most common groups within our target users. These groups and needs have been derived based on existing literature, and more importantly ranked in priority to assist the designers to reach the largest number of potential users. This ranking may serve as a reference of major concerns which we believe that they should be addressed in a website, especially to include older and disabled users. It worth mentioning that these ranks serve the needs of most web sites, but content specific design decisions may change the order of these rankings in a real life scenario (e.g. Multimedia streaming websites, or sites targeting/serving a specific group which becomes the highest priority).

There are many different ways to accomplish each need and most of these will be specific to the goal of the site. Many web standards (primarily the DDA, WIA and PAS 78) suggest ways that a web developer can implement usable environments relating to issues in Table 1. For

our design it was attempted to address issues 1-5 through a set of objectives described below.

Table 1 – Prioritised table of needs

Priority	Issue	Background
#1	Designing to standards and specifications	Prioritised highest because of its overall importance and impact towards usability and accessibility.
#2	Visual Impairment and Blindness	Loo et al. states visually impaired persons are not able to obtain the full benefits of Internet [6]. Ranks highly due to the large number of users that could be assisted by improving these principles.
#3	Partial and Poor Vision	Similar to Visual Impairment, Partial and Poor Vision requires less specific visual adoptions but remains of high importance for users that need moderate levels of assistance.
#4	Restricted Mobility	Primarily for disabled users who may require additional hardware for navigation
#5	Colour Blindness	Research suggests that red-green colour impairments affect 6-10% of boys and 0.4-0.7% of girls [7]. Improvements in this area can improve the website experience for many users.
#6	Audio	The delivery of audio is important in media driven web design. There are alternative or different ways of using audio more efficiently. Prioritised low due to the lack of audio in common site navigation.
#7	Epilepsy	Photo sensitive epilepsy can trigger seizures if poorly designed multimedia content is provided. Lowest in priority due to the rare nature of this condition.

Web site design is being directed toward, and in some cases legally bound to design principles which aid accessibility to disabled users. These standards are becoming highly respected, and adhering to them demonstrates a level of professional social responsibility, and equity of access to information and services. The most influential guidelines are listed below with their unique properties, each of which was referenced during this project's development.

UK DDA: The UK Disability Discrimination Act 1995 [1]. The legal duties imposed by the DDA have come into force gradually and web site owners have had these obligations since 1999 when Section 21 was rectified to include web design.

WAI: The Website Accessibility Initiative (WAI) [2] is one of the earlier standards, first surfacing in 1994 just as the dawn of browser based Internet browsing was introduced to the mainstream. It was derived by the World Wide Web Consortium (W3C) who is also responsible for the design of protocols that ensure interoperability within the web.

PAS 78: The PAS 78 guidelines of 2006 [3] suggest a comprehensive list of principles for web designers to make sites accessible. There is a call from some to make the PAS 78 guidelines a legal document, and this may occur with future iterations of the existing document or become part of the Disability Discrimination Act of 1995.

The first stage towards creating an accessible website is to take note if these standards are appropriately format and control the content as per their specifications. From here the site's content falls into an accessible template. This template is the designer's largest undertaking, and although there is no right or wrong visual style, certain layouts provide more usability benefits than others. We can see this demonstrated in current existing work within the accessible website domain. Nomensa [4] is a good example (Figure 1), and a particular place of common reference for this project, which shows many accessible principles as a working website model. The effective use of colour to separate navigation from content, the clean and un-cluttered tabular (CSS driven) layout, and introducing imagery to the main navigation links, are reinforcing the accessibility considerations (for those with Visual Impairment). Also, navigation is appropriately positioned at the head of the page and retains its positioning on every subsequent section. This design promotes accessibility in many ways; however it is not without its own shortcomings. Ideally, there is a desire for users to be able to customize their experiences [5]. Some sites also assume that their users have fast Internet connections (as demonstrated by heavy image usage), and this is something that should be carefully considered. We can also identify the importance of using appropriate colours to compliment navigation systems.

After research and analysis, the following objectives were set to improve web design for accessibility:

1. Produce a website which features appropriate assistance to aid users who have visual impairment or are blind, through striking visuals and simple navigation.
2. Produce a website which outputs correctly on screen readers.
3. Allow the user to customise the colour scheme of the site, and save this as a cookie on the user's browser.
4. Keep multimedia use to a minimum.
5. Design should be kept simple, with a navigation bar viewable on all pages, and labels so that the user can always return to the home page.
6. Including a FAQ and Site Map on every page.
7. Content is relevant, prose is concise.
8. Cross browser compatibility.
9. Develop a website which passes W3C validation tests for XHTML and CSS.

Observations of users using a test website

After carefully considering the accessible approach to web design and the above set objectives, a test website was designed and developed as shown in figure 2 (a copy of which is online at http://tbevan.co.uk/WebAccessibility/). This site adhered to the previously assigned objectives, including its use on screen readers. Besides the large navigation buttons, with imagery, the left navigation links, are always available at this position for all pages. Moreover, at the lower half of this navigation menu, there are "viewing options" (as highlighted in figure 2), which address many of the users' requirements to customise the viewing of the site. For comparison we also found a traditionally designed website which had similar content.

As a test method for this style of web design we decided to actively compare our website to that traditionally designed website. To assist this comparison, two volunteers – one a 78 year old male with Parkinson's disease the other a 73 year old female – performed a number of common quantitative and qualitative tests for both sites. The results of the quantitative test are shown below as they offer statistical comparison for simple evaluation. Qualitative tests are assistive during evolutionary development of the site to improve its design.

Figure 1 – Nomensa.com

For quantitative evaluation, the volunteers were given few tasks to complete, using both sites, our site and the traditionally designed one. By totalling the times it took to complete these tasks (as depicted in table 2), it was established that the site with improved design principles gauged from standardised design and ranked accessibility principles were more successful at decreasing the time (and therefore improving the efficiency) of the users' experience. It can be argued that the total performance improvement is relatively marginal. However, especially for the case of Person A, there are other factors that affects/contributes to the improvement for such a case. This includes any specialized interfacing hardware that compensate for the severe medical/health condition of such cases. It is also expected that the value of the improvement would be more noticeable and beneficial with larger and longer tasks and testing procedures. We should also remember that timing is one quantitative measure/criteria. However, there are other qualitative factors supporting the design. Through observation and speaking to volunteers, they repeatedly expressed their reasonable comfort and feeling of improvement (easier accessibility) in our sample site design. Hence, they seem more satisfied (even morally). This is in fact an important factor that could make a difference between users using the service/site and others who may go away from it (which is a common problem for older and disabled users).

Conclusion

In this article, a user-centred web design, implementation, and testing has been presented. First, different levels and forms of disabilities and/or user requirements have been identified, analyzed, and prioritized. This aimed at maximizing the web accessibility for the widest

number of users as possible. Then, common web design principles have been identified and attempts to develop solutions have been successfully achieved. This has been demonstrated by a sample website model that has been designed and implemented based on the above user-requirement analysis and the identified design flaws. The quantitative measures for testing these implementations were based on timing the observation of disabled and older users using the sites to accomplish given tasks. It was decided that the quicker the user achieved a task the more efficient the site proved to be. What is pleasing is that even in a small test we can see implementation principles having an advantageous effect, and proving that relatively basic implementations can be effective.

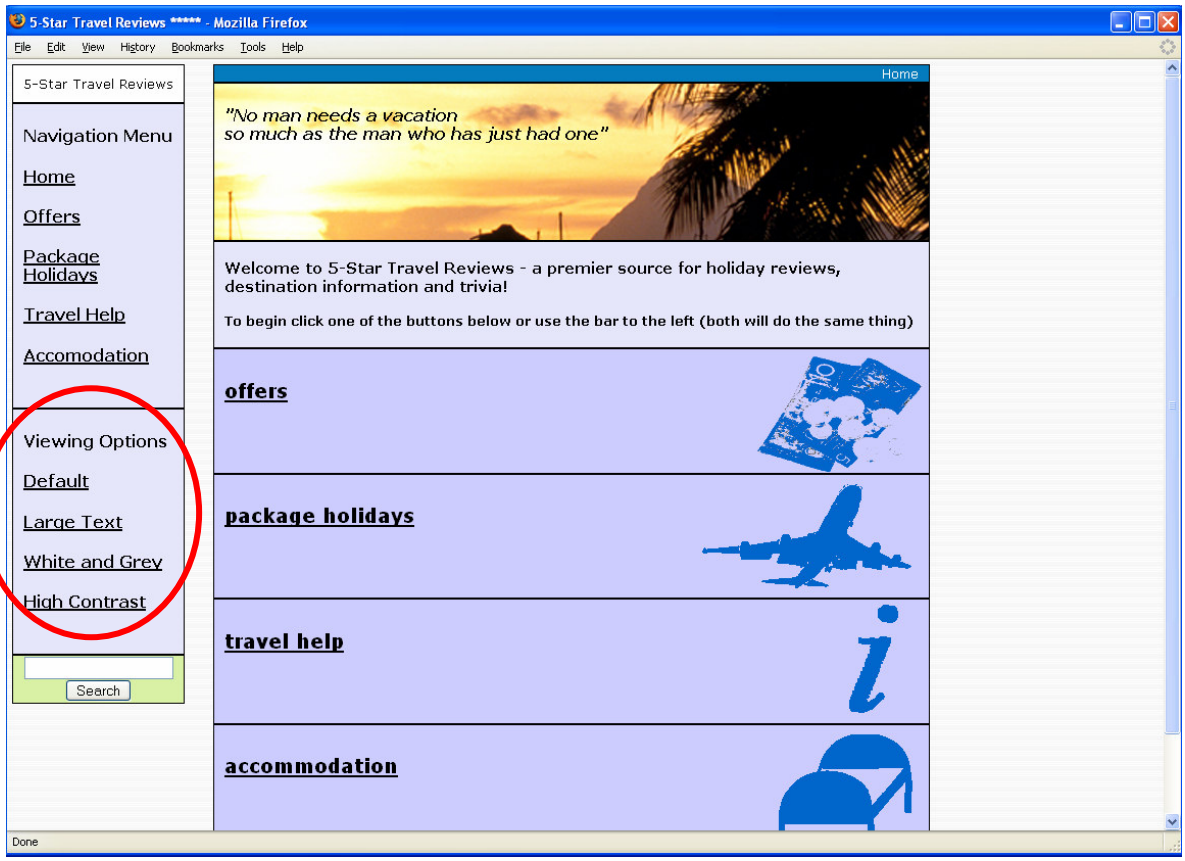

Figure 2 – Our sample website

Table 2 – Quantitative Test Results (s=seconds, m=minutes)

Task	Site A: Badly Designed		Site B: Improved Design	
	Person A	Person B	Person A	Person B
Navigate to a link on the menu and click it	30s	10s	25s	10s
Use a search mechanism to query the site	60+s	30s	50s	20s
Find and navigate to the FAQ	30s	10s	30s	8s
Return to the home page	20s	10s	15s	5s
Totals	**2 m 20 s**	**1 m 0 s**	**2 m 0 s**	**43 s**

The described experiment proved to be a success, and provided a feeling of confidence that ranked accessibility principles assisted the design process. But to provide more definite conclusion, more exhaustive tests and evaluations need to be conducted on a larger scale. This would benefit from the involvement of organizations that have interest and/or care of the targeted user groups, as this would be difficult to achieve without their support.

Following observations we state that even though one may follow guidelines and standards, the immense deviation in people's conditions makes it difficult to create a design that satisfies everyone. These findings may begin to highlight a reason why we are not adapting to standardized web design sooner than we perhaps should have. As such the devised table of needs, which provides benefits to designers, goes someway to assisting with accessible approaches to their sites, and this study has proven to increase the efficiency of our two volunteers browsing experiences.

The Future

The future of web design must adapt to a standardised approach in time. This may be slow at present, but is increasing as the benefits of good web design become prevalent. The distinct reality is that our dependence on the Internet, or more specifically the Web, is exponentially increasing. This is highlighted by the older person (with Parkinson's disease) who felt it necessary to use the web even in their disabled state. To cope with these increases, we need more appropriate regulations to govern its use and facilitate better accessibility and usability for most (if not all) users. What is also proven is that adapting a website to be more accessible and usable is beneficial for all users, not only the disabled and/or the older users.

As a suggested continuation of research in this area, it would be useful to conduct more exhaustive user tests to find a definitive set of requirements from a larger census of the demographic. From here it might be suggested to develop examples which meet these requirements with larger sets of volunteers, using similar methodologies and test strategies as demonstrated here.

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Effective requirements gathering for older adults

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Introduction

Eliciting appropriate requirements from users is an important part of the software design process. However, increasing evidence suggests that for many groups of older people lacking the experience and familiarity with many aspects of new technology, this can be a particularly difficult issue to address. Further, this issue is critical in regards to novel and emerging applications that break away from the 'traditional' desktop/workplace interface domain, and reside more in the domestic/entertainment/leisure domain. Thus the challenge is to address user-requirements before they are implemented, and in doing so create more meaningful dialogue with potential older users about applications and devices that do not actually exist yet.

Research challenges

Research suggests there is an increasing need for more appropriate methods in the design of technology for older people (e.g. [2]). Despite this, little literature is currently available on how to gather appropriate requirements from older population groups, particularly for novel applications. As a result, significant challenges remain in exploring and developing methodologies that can truly allow older people to understand, visualise and articulate genuine 'user-centred ideas' based upon very limited (prior) experiences of digital technology.

Part of the problem of knowing how to design for older people stems from the realisation that traditional user-centred methods do not provide adequate or appropriate insights into how to do this. Focus groups, for example, are typically still fraught with the problem of assuming users know what they want. This is clearly problematic for those older people who do not have the same conceptual framework to articulate ideas about new technology.

Other problems relate to the stereotypical assumptions that older people are generally technophobic and otherwise homogenous by nature. This is simply not the case. Increasingly, studies have identified that older adults are often willing and able to use technology if they can see the potential benefits and can properly understand how to use it. Linked to this issue is often the failure of mainstream designers to account for the huge diversity within older populations on a wide range of different dimensions (e.g. cognitive/physical abilities, lifestyles, etc.).

In relation to this, while increasingly, at least within the multidisciplinary area of Human Computer Interaction it is recognised that functions in sensory, physical and cognitive abilities typically decline within ageing adults, it is important to stress that these age-related changes relate to the population as a whole and are accompanied by an equivalent expansion in diversity between the 'most' and the 'least' able. Therefore, many people experience only modest reductions in their abilities as they get older, remaining healthy and active into old age, while others will become very frail and incapacitated. Thus, developing suitable technologies for 'older people' is far from being a straight forward process.

While some attention is occasionally paid to accommodating age-related declines in interface design, much less emphasis has been focused on the impact of generational differences on the relationship people have with technology. Studies by Docampo Rama [1] have recognised the importance of older people, who have grown up learning from distinctly different mechanical models associated, for example, with push button and rotary dial interfaces - characteristics that have typically disappeared in the design of contemporary software interfaces.

Consequently, for those people without the working knowledge of modern interactive systems, it is unsurprising to find ideas for new applications drawn from experiences in using telephones, typewriters, or work situations which may have pre-dated the use of the personal computer and its associated 'desktop' metaphor. Significantly, it is this accumulation of a lifetime of knowledge and skills in using electromechanical systems that mainstream designers often fail to consider.

Also, within older population groups, variability between and within people's current and recent technology experience must be considered. Although this is far from a clear-cut issue, differences in attitudes towards, and perceived utility and uses of new technology by older people unfamiliar with computer systems, can be far more challenging. Particularly, in comparison to those people confident enough to draw from 'first hand' experiences and/or working mental-models of using similar systems they understand.

Research at Dundee

Research within the School of Computing, at the University of Dundee covers a number of projects involving groups of older people to strive for more creative, novel, and ultimately more suitable methods of eliciting requirements in the early stages of the design of user interfaces for older adults. These include:

- Drama-based scenarios performed through Forum Theatre, established as a means to encourage and support open dialogue between researchers, designers and older users. This typically comprises of various stakeholder groups, including older audiences, professional actors, an experienced facilitator, and a scriptwriter (see Figure 1). In essence, Forum Theatre has been found to be a successful way of encouraging older people with little or no technical knowledge to partake in realistic discussions concerning solutions and issues with technology usage in their day-to-day lives [4].

Figure 1. Examples of the Forum Theatre in practice; (left), Actors, facilitator and technical staff within the theatre setting; (right), Audience members engaged with the performances.

- A variation on this is dramatised stories portrayed through video which have also been developed to inform, and alter, the mind sets of designers concerning the needs of older people, in order to counteract the tendency for designers to effectively 'design for themselves'. The UTOPIA Trilogy (http://www.computing.dundee.ac.uk/projects/UTOPIA/utopiavideo.asp) portrays scenarios representing the common aspects of 'hi-tech' interfaces that do not take older adults abilities into account. Such video stories have also been used to investigate the applicability of an intelligent vision system to monitor the well being of older people within their homes, and was used to indicate some of the potential human impacts of such a system, and to act as a support for further discussion of related issues with potential users and other stakeholders [3].

Other projects at the School of Computing focusing on aspects of technology for older adults, currently include:

Digital interactive television for older people

Several strands of research are currently being driven by the switchover in the UK and accessibility/usability problems of current digital television systems. This research includes an exploration of more novel application areas to support social interaction for older people, such as communicating with family and friends. Methodologies (such as Forum Theatre) and new interaction approaches relating to the implementation of future TV systems have been investigated. Research within digital television also includes the implementation of a memory prompting and schedule maintenance system for people affected by the early stages of Alzheimer's, as well as other mild cognitive impairments.

Work is also ongoing in the area of identifying the relationship between particular cognitive abilities known to affect interface usability (that tend to decline with age), and the ability to use (simulated) digital television applications. This has the aim of providing more useful ability data to designers which captures the diversity of the population and which should help to move away from the current concept of design for the elderly which helps perpetuate the erroneous view that older adults are an homogenous population.

Interactive communication systems for people with dementia

In conjunction with the University of St Andrews, the school is developing hypermedia communication systems usable by carers and patients with dementia. Two related projects include CIRCA (Computer Interactive Reminiscence and Communication Aid), a multimedia touch screen system designed to deliver reminiscence material, to stimulate conversational prompts and support for people with dementia (http://www.computing.dundee.ac.uk/projects/circa) and LIM (Living in the Moment) an interactive system designed to be used by dementia patients without support from a carer, as a form of entertainment and stimulation.

Advanced home care systems to support independent living

This includes investigating the uses of advanced technologies (such as ubiquitous and mobile computing) in support of older and disabled people with long-term illnesses, physical and mental impairments (http://www.match-project.org.uk/main/main.html). In conjunction with a variety of project partners, researchers at Dundee have primarily been exploring data visualization and mining techniques from sensor data to define daily patterns in home living, in addition to the development of activity modeling techniques to identify changes in progressive diseases such as Parkinsons.

Computer vision and assistive technology

This research is concerned with the use of computer vision and artificial intelligence to non-invasively assist persons with dementia to undertake daily activities. Recent work has included

the development of a real-time system that helps a person with dementia to wash their hands, providing audio-visual prompts when necessary (http://www.computing.dundee.ac.uk/staff/jessehoey/coach/index.html).

Augmentative and alternative communication

Although this work is not directly related to ageing research, the school is currently developing systems that support the pragmatic development of language and interactive communication of children with complex communication needs.

Summary

Faced with the realisation of ever more advanced and superior forms of computing, there is an increasing danger that those people who remain at the fringes of information and communication technology will be pushed further way. Critical challenges remain in the elicitation of information from those people who may assume they have no 'expertise' to generate ideas about new interactive systems. Avoiding the potential to patronise and treat all older people the same, more creative and user-centred methodologies are required throughout the software design process. This is necessary if we are to better understand what older people want, need and comprehend from emerging technologies.

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Mark Rice has four years experience in disability and ageing research, and is currently a Research Assistant at the Queen Mother Research Centre, University of Dundee. With a multidisciplinary background in Art and Design, Communication Studies and Computer Science, his research interests span areas of Human-Computer Interaction, Software Engineering and Information Visualisation. Mark is currently working on the development of a TV-based prompting and reminder system to support people with Alzheimer's, in addition to completing his PhD on the design characteristics of a communication system for older people via digital interactive television.

Following a BA in Psychology (specialising in cognition) at the University of Newcastle upon Tyne, *Alex Carmichael* started his research at the Age and Cognitive Performance Research Centre, University of Manchester. This research examined the cognitive human factors of older people using an audio description of television service (AUDETEL) and formed the basis of his PhD. This and other projects examining interactive services for older people resulted in a Research Fellowship from the ITC (Independent Television Commission) in 1997. Alex recently moved to the University of Dundee where he now contributes to several projects involving older people's relationship with technology.

Accessibility Research at the Department of Mechatronics at Darmstadt University of Technology

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How It All Started

Before the first author joined the department, the research group around Prof. Nordmann exclusively focused on 'classic' Mechatronics issues, such as *active magnetic bearings* and *squeeze film dampers*. This changed in 2004, when the first author – who had developed a hands-free control system for an electric wheelchair within the framework of his PhD thesis (see [1]) – became an active part of the group.

While the aforementioned 'classical' topics – commonly dealt with by a department in mechanical engineering – continue to be the main concern, they are supplemented by various accessibility issues to a growing extent. The next section talks about different projects that are currently worked on. Those can be divided into two major areas: the interface between a (human) user and a machine (e.g., a PC or a wheelchair) on the one hand, and the development of an intelligent wheelchair on the other hand. Both domains will be introduced in more detail below. This presentation of the 'accessibility part' of the research group is concluded with some words on future work in section 3.

Current Projects

The first part of the currently running projects (described in the following subsection) comprises works that have already started a while ago and have been initiated by the first author. The second part (detailed further below) consists of newer projects (i.e., having been started just recently or being about to be started, respectively) which are supervised by other members of the research group.

Input Interface

The first author works on the question, how someone with a severe physical disability, allegedly not able to use the hands, can operate a computer (or a computer-mediated device like an electric wheelchair). The main problem is that such devices *do* require manual input in the standard case, e.g., involving a keyboard and a mouse or some sort of a manual joystick (as far as a wheelchair is concerned). Therefore, an alternative is needed.

The basic architecture of the alternative chosen here is given by a so-called bio-signal interface, as depicted in fig. 1.

Such an interface examines the time series originating from a certain bodily function of the user (such as brain-electrical or muscular activity) and tries to detect recurring patterns in the input stream, e.g., with the help of a neural net classifier [6]. In response to the detection of one of those predefined patterns, a corresponding output command is generated. This means that the user can trigger desired commands by willfully altering the monitored signal and producing a particular pattern (see also [1]).

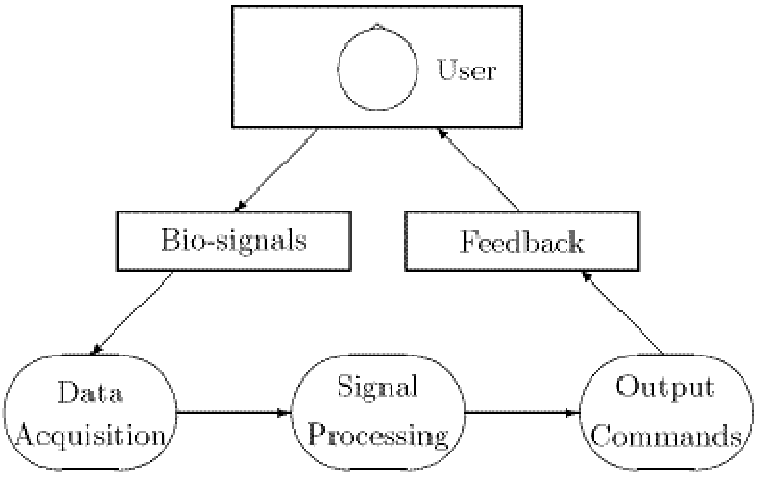

Fig. 1: Basic architecture of a bio-signal interface

One very popular type of bio-signal interface in the context of persons with *physical* disabilities is called *brain-computer interface* (BCI), where the EEG signal of the user is monitored and analyzed (see [3]). The nice property of a BCI is that it demands only *mental* input and can thus (in theory!) be used by anyone with a clear mind. However, there are a number of drawbacks speaking against EEG-based BCI's:

1. Producing particular EEG patterns is not at all trivial and might require extensive training (some users may not be able to learn it at all).
2. BCI's are awfully slow (with output rates of mostly less than 30 bits per minute).
3. EEG analysis is terribly sensitive to noise (see also [5]).

As a consequence, it was decided not to continue working on BCI's and to concentrate on a less sensitive bio-signal instead. It turned out that the detection of intentional muscle contractions by monitoring muscular activity can be done very easily and reliably, while the physical load on the user is minimal. Therefore, the ultimate goal became to develop an interface demanding as little physical (muscle-based) effort as possible, while at the same time being very robust and almost insensitive to noise.

Given the right sensor (see fig. 2), the user can issue intentional contractions with extremely little effort, e.g., by simply raising the eyebrow. The sensor is based on a piezo element *actively* producing a voltage potential when deformed. That is why a sensor attached to the user's forehead with the help of an elastic headband *selectively* responds to contractions of the brow muscle. Constantly improving and refining the acquisition aspect of the interface – e.g., size, power supply, and amplification circuit of the sensor – is also one of the tasks coped with by the department.

The good news is that the headband sensor is just an example. Virtually any muscle can be chosen instead of the brow muscle, e.g., a facial muscle. Using a different muscle merely requires an adaptation of the sensor (another example sensor examined here measures the pressure caused by blowing into a test tube, which indirectly corresponds to a contraction of the lungs). Since the resulting interface merely requires the use of a single muscle of choice, it can be used by almost anyone (most people with physical disabilities – even when otherwise completely *locked-in* – have retained reliable control over at least one – sometimes the strangest – muscle group).

Fig. 2: Headband sensor (optimized for the brow muscle)

To detect the contractions, it suffices to simply look at the muscular activity (i.e., the sensor output) and to decide whether or not this exceeds a certain (user-specific) threshold. That way it is very easy to record two distinct input signals – *single* and *double contractions* (SC's and DC's). For an SC, the threshold is exceeded once, and a DC just consists of two single contractions issued in quick succession (in analogy to single and double clicks with a computer mouse).

The idea behind the input interface being developed here in the department is to keep track of an internal state by processing the temporal sequence of SC's and DC's, and to generate output commands corresponding to the currently active state. The state transitions are depicted in fig. 3 (while the labels depend on the actual target application).

The transition diagram always consists of five states: the initial STOP state (where the interface generates some sort of a 'halted' output) and four 'moving' states (e.g., standing for the four compass directions). The basic principle of the interface means to start or stop moving with a DC and to cycle through the four moving states with SC's. This interface has been implemented in two target applications (which provide the – mostly visual – *feedback* for the user mentioned in fig. 1), to be introduced in the following. Both applications are – by the way – under ongoing development.

Human—Computer Interaction

The first application is a tool allowing its user to operate a PC without using the hands. The software is called HaMCoS (for HAnds-free Mouse COntrol System), and it represents some sort of an extension of a GUI-based operating system (so far only implemented for Microsoft® Windows®) making it possible to control the computer mouse with the muscle-based interface (where the only piece of hardware – in addition to the PC itself – is the piezo sensor which interfaces with the standard microphone input of the computer's sound card).

The 'moving' states of fig. 3 correspond to two-dimensional movement of the mouse cursor. Furthermore, the user can trigger a mouse click by reverting to the STOP state at any time (or position on the screen). For an introduction see [2] – the original idea is presented in [4].

The system comes with a comprehensive framework [7] of auxiliary functions mapping everything to mouse input, thus giving a HaMCoS user total control over the computer. For example, it is possible to comfortably enter text (see fig. 4), browse the Internet, manage windows and processes, and even play a game using HaMCoS only.

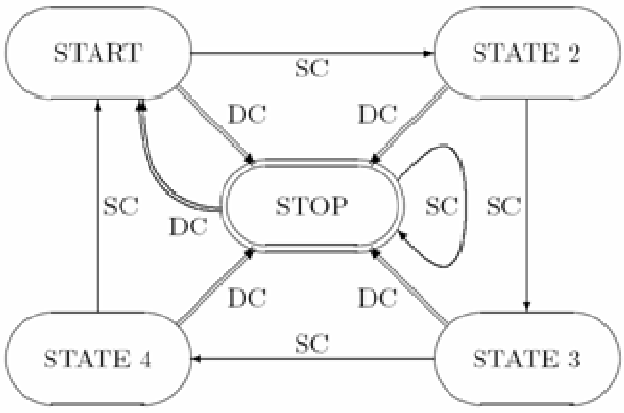

Fig. 3: Five states determining the output

Fig. 4: Entering text without using the hands

Improving and extending the system and its framework represents a broad area of active research (e.g., [9] and [8]).

Wheelchair Control

The second application is called HaWCoS (for HAnds-free Wheelchair COntrol System), and it does almost the same as the first – only that this time, *not* a *virtual* (or graphical) object (a mouse cursor) is moved, but a *physical* one (an electric wheelchair). The system enables its user to independently control his or her wheelchair without the need to use the hands (see fig. 5), and its first version is introduced in [5].

In this case, the four 'moving' states do *not* contain FORWARD and BACKWARD. Instead, LEFT and RIGHT (which here mean *turning* motion, since a wheelchair usually cannot – just like a car – drive sideward) are interrupted by two STRAIGHT states. This makes driving a lot smoother!

The extended and enhanced version of HaWCoS (see [10]) has been implemented in two variants: a software-based simulator and a (hardware) stand-alone device. The revision of those two variants is also part of the department's current accessibility research.

Fig. 5: Hands-free wheelchair control

Intelligent Wheelchair

Controlling an electric wheelchair in a *standard* way is virtually impossible for someone with a *very* severe physical disability. Therefore, it is necessary to adapt the wheelchair to the individual capabilities of the wheelchair driver, not only concerning the input interface, but also with respect to certain navigation assistance.

These considerations led to the idea of developing a 'mechatronic' prototype system, which should be known by the name DANA (for Darmstadt Active Navigation Assistant). The prospected realization of the system was some sort of electric wheelchair with a user interface based on the control method described in the previous section. The architecture underlying the DANA concept is depicted in see fig 6.

The system was intended to be 'intelligent' in the sense that it should be able to assist the driver of a wheelchair (i.e., its user) by *actively* intervening at certain points of the navigation process. In order to further increase the independence of the wheelchair driver, it was decided to examine possible ways of adding some extra hardware, enabling the system to autonomously climb stairs (and high curbs).

While DANA was still in its planning phase, it soon became clear that it will *not* be realized as *one single* project. Rather, different aspects (and components) were elected as the starting point of ideas here in the department, which will most probably serve as basis for several Master's and PhD theses in the near future.

Some initial work will get under way in the second half of 2007 when a negotiated cooperation between our department and the department of mechanical engineering of the University of Campinas (Brazil) is set off.

Navigation Assistance

It is true that the control method based on muscle contractions described further above demands extremely little physical user interaction, but it inherently yields a very 'choppy' (discrete) driving style (as HaWCoS only allows to either turn or go straight, but *not* to drive

voluntary curves). The foremost task of a navigation assistant combined with the 'HaWCoS interface' is to compensate this and thereby render a more 'continuous' driving possible.

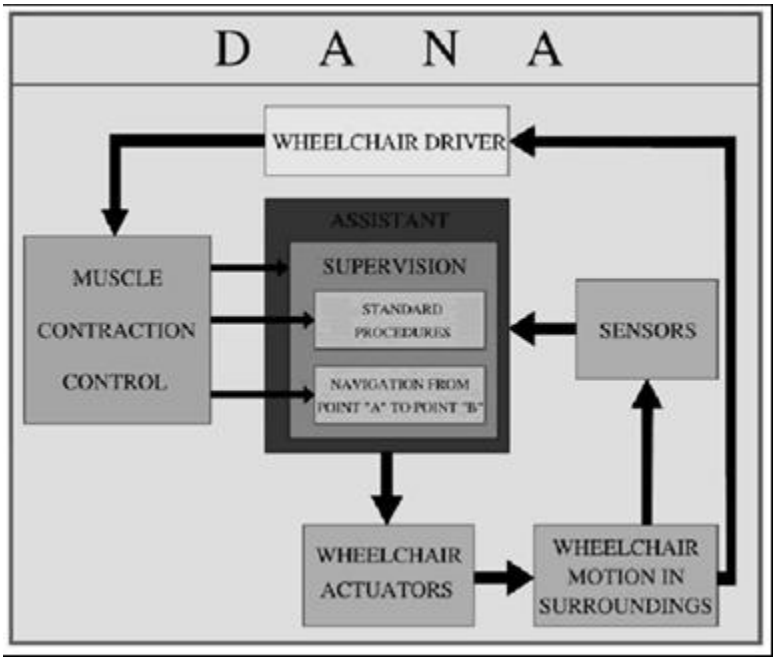

Fig. 6: Control loop characterizing DANA

In general, a system assisting the navigation of a wheelchair has to cope with three situations. Firstly, it has to constantly supervise the wheelchair movements and to intervene if necessary (in order to avoid obstacles) when the user wants to drive directly. Secondly, it has to be able to perform certain standard procedures (such as door passage or following walls) automatically – once triggered by the user. And finally, it should offer *autonomous* navigation to a destination location entered by the user.

The basic prerequisite for this kind of navigation assistance is a detailed picture of the surroundings which has to be constantly updated. Therefore, the wheelchair has to be equipped with a sufficient number of sensors, e.g., infra-red sensors, ultra-sonic sensors, or cameras. Realizing the system and combining all of its components requires a detailed closed-loop model.

Stair Climbing

Another interest in our department is going in the direction of stability control and stair-climbing systems. Especially, a mechanism which normally drives on two axles and (in case of stair-climbing) one which is capable to 'stand-up' is in the interest of the research.

There are some possible applications for such system: stair-climbing, moving around at eye-level, or reaching items on high shelves. Also, one can imagine moving autonomous vehicles of the same type without driver, to serve like trolley or similar.

From the control point of view the challenges are:

- Developing a control algorithm which is capable to switch between the stable position which is shown in situation 1 (fig. 7) and unstable position shown in situation 2
- Positioning and driving of the wheelchair in upward position
- Climbing and balancing the stairs (limited space)

- Robust control algorithms – for instance to compensate different mass and position of the driver
- Security aspects – like fault tolerant control and emergency programs

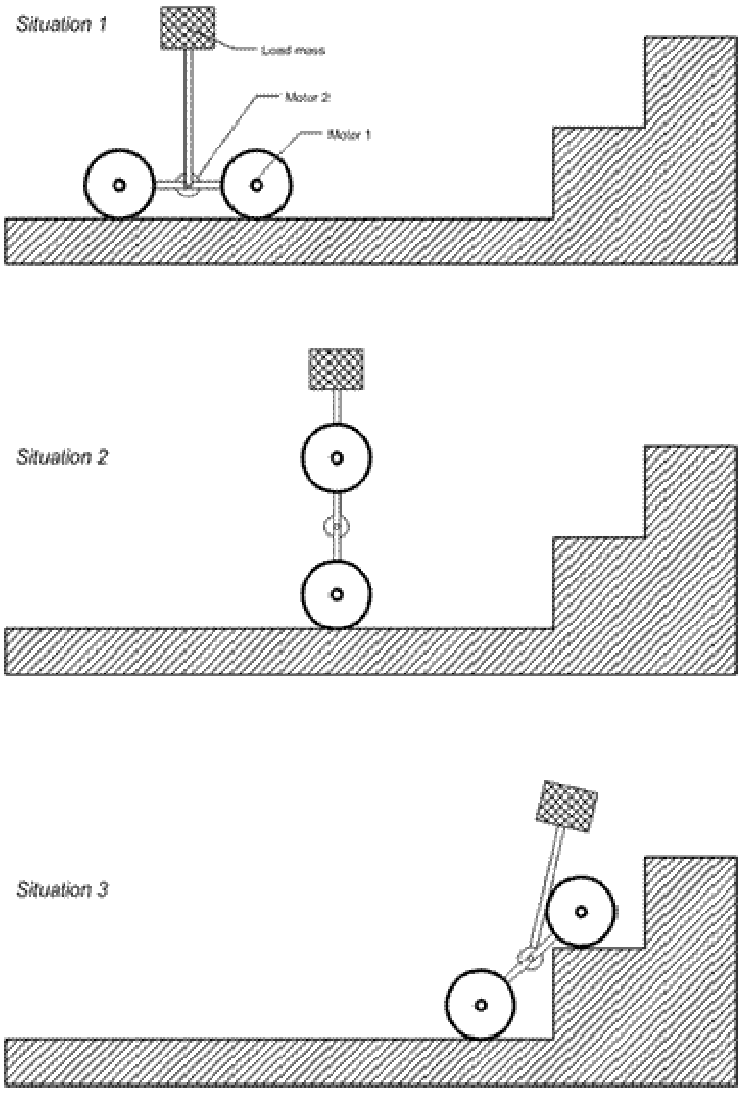

Fig. 7: Wheelchair sketches at stair climbing

The first step is solving some basic problems like controlling the simple inverse pendulum (fig. 8). This system is simpler than the wheelchair, but it keeps one of the main characteristics in the wheelchair's upward position – instability. Besides, this one should solve the problems of angle determination using different sensors like gyroscopes, inclinometers and encoders. The inverse pendulum can be driven by DC motors and controlled using a dSpace system for real time control algorithm calculation.

A similar approach in our department deals with the construction of models of mobility modules for wheelchairs by using integrated system simulation.

To make autonomous movement with wheelchairs comparable to human walking available, some components (modules) are still missing. One very plausible example is the possibility to climb up stairs without the help of other persons or external technical equipment.

To improve the process of developing and constructing such a module, the use of computational simulation tools is one part of the studies in this field of wheelchair research.

Integrated system simulation in this context means that the aim of the work is to generate only one model of the mechatronic system, including the mechanical part, the control system, and also the actuators and sensors.

For this purpose, a wide range of simulation tools is in use:

- MSC Adams (Multi-Body systems)
- MSC Patran/Nastran (Finite elements method)
- Matlab/Simulink
- MSC Easy5 (Controller Design)
- LabView
- Atmel AVR-Studio (Microcontroller)

These tools are combined to generate models, as you can see in fig. 9 for a stair-climbing module.

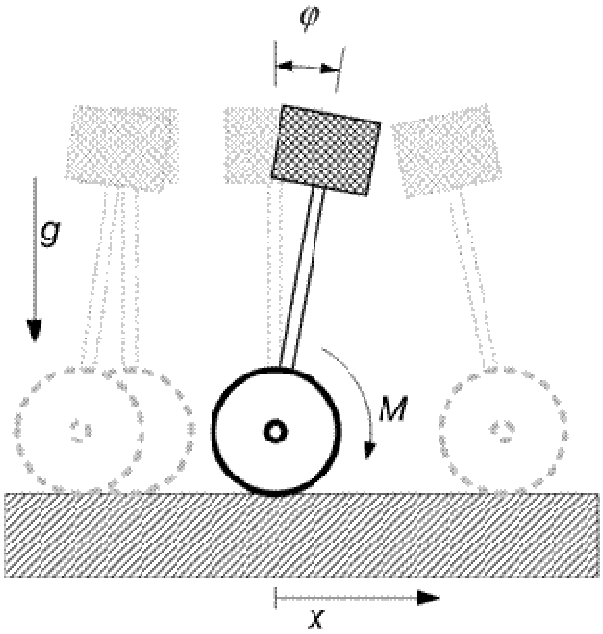

Fig. 8: Inverse pendulum on one axle

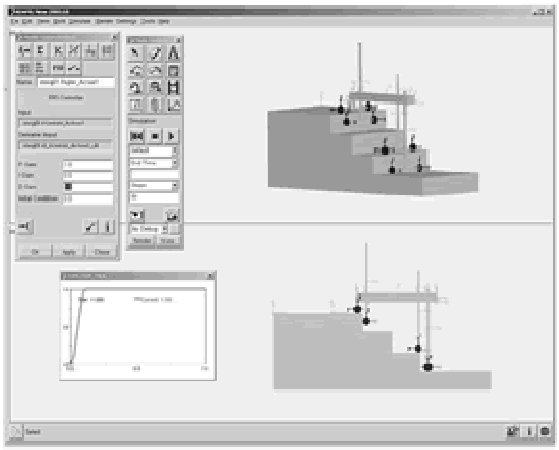

Fig. 9: MSC Adams model of a stair-climbing module

The other part of the work is to build real physical models of the theoretical ones, to have the possibility to perform real tests with the constructions. In fig. 10, the physical model of the stair-climbing module is shown.

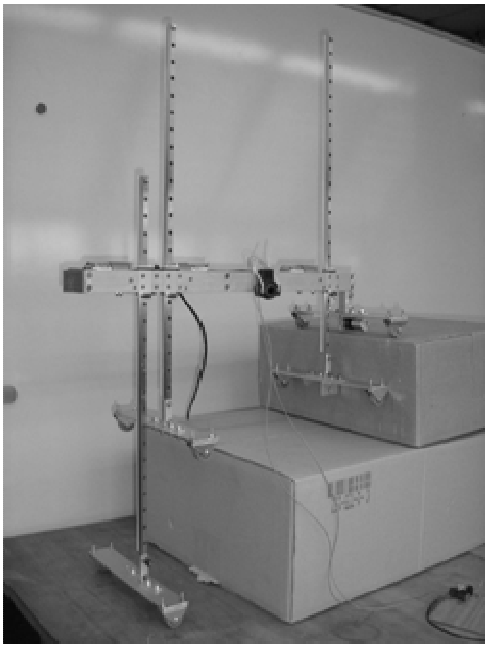

Fig. 10: Physical model of the stair-climbing module

With the results of the real tests, an improvement of the simulation is possible by comparing simulation and test results. The improvement of the simulation environment generates a big advantage for faster and cheaper mobility module development.

Conclusion and Future Work

This report contained considerations about ongoing current work in the 'accessibility part' of our research group. Furthermore, especially the passage about the stair-climbing pendulum points into the direction of future plans. Two additional tasks shall be mentioned here which are concerned with concrete intentions for the near future.

The immediate next step in the line of work associated with the HaMCoS software requires going to hospitals and rehabilitation centers and having patients (i.e., potential future users) test and evaluate the system. The second task involves the difficulties encountered with driving 'straight' with the wheelchair used as a base for HaWCoS (as the front 'caster' wheels only allow *passive* steering, their orientation – when the user wants to go STRAIGHT – heavily influences the true movement direction). Our idea is to compensate this by adding two sensors measuring the (relative) angular velocity of the rear wheels.

Those two tasks clearly reveal the interdisciplinarity of our approaches. Just like virtually any work in accessibility research involving any hardware, they combine findings originating from (at least) the following domains: mechanical engineering, computer science, electrical engineering, mathematics, physics, psychology and medicine.

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Martin Ernst received his Diploma in Mechanical Engineering from Darmstadt University of Applied Sciences, Darmstadt, Germany in 1992 and from the Darmstadt University of Technology in 1997. After working for different industrial companies and scientifical institutions he is research associate at the DMME since 2003. His research interests include Dynamics of Structures and Machines, Simulation Techniques for Mechatronic Systems and Mechanisms.

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Rainer Nordmann received his Diploma in Mechanical Engineering from Darmstadt University. His PhD (Dr.-Ing.)-Thesis is about Eigenvalues and Eigenvectors of Turbomachines. From 1980 to 1995, he was Professor for Machine Dynamics at the University of Kaiserslautern, and since 1995, he is Professor in Mechatronics at Darmstadt University. His research interests are in Dynamics of Rotating Machinery, Dynamics of Structures and Machines, Mechatronic Systems in Mechanical Engineering.

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The HCI at the CTU has a long tradition of research of interaction methods for people with difficulties, especially for the users with vision impairments. As of June 2007, our HCI group counts 4 faculty members and 4 PhD students; however, numerous BSc and MSc students of the CTU are also involved in the research by direct appointment or through their coursework in the HCI-related subjects and thesis projects.

This paper provides a short summary and bibliography of the accessibility research at the Czech Technical University in Prague. It also presents an overview of our collaboration with our industrial partners that is related to the assistive technologies as well as our training and networking activities.

HCI for People with Vision Difficulties

Our HCI group is an integral part of the Computer Graphics Group [23] which determines the scope of our research. We address first of all the problem of delivery of graphic information to the visually challenged users.

One of our first initiatives was to create a tool for exploring the 2D graphic information in a semantic approach. The project was called *Blind Information System*. The goal of this project was to help visually impaired people perceive 2D graphic information [5]. The pictures can be characterized the relations among their semantic elements. E.g., layout of an apartment can be presented as a description of spatial relations. We have developed a consistent method how a semantic description is generated from the graphic information. We have covered the methodology, authoring tools, as well as a browser of the end users.

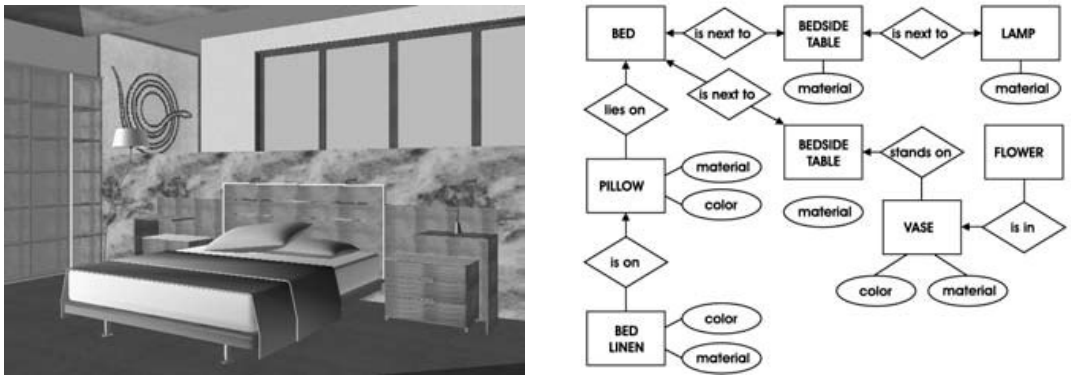

Fig. 1: a) 3D scene; b) an example of a possible annotation

Later, we have extended our efforts to the 3D environment. In project *Speech-based Navigation in 3D Virtual Environment* we created a virtual navigation system, as described in [7, 4]. It was based on an enhanced annotation of 3D scene comprising of textual description of all objects and their relations (see Fig. 1a, 1b). The avatar (that represents a user in the virtual scene) could move freely in a virtual scene and get the information about the surrounding environment using queries and thus navigate in the environment.

The queries allowed inspect object properties, relations, avatar's neighborhood etc. The queries could be such as "what are all objects in the room made of metal?" or "which are nearest objects?" The navigation and queries were controlled by mouse gestures and all feedback from the system was given through a text-to-speech modality. In a modified version of this application, we simulated the cane tapping. We have acquired a collection of sound samples covering the impact of the tip of a cane on different materials [8].

Our next area of work was in the *Haptic- and Audio-Based Navigation using Low-Cost Devices.* In this project we focused on using low-cost haptic devices to allow visually impaired users explore a virtual environment. As described in [8], we compared the usability of a haptic mouse device and a force feedback joystick when tracing the layout of an office space map and the shapes of geometric objects. The force feedback joystick proved useful in exploring local conditions while the haptic mouse performed better in getting the gist of the global situation.

Our latest direction of research is the use of tangible user interfaces to deliver graphic information. A prototype described in [13] allows the users to explore the layout of newspaper page by tracking their index finger on its surface. A camera, mounted above the table where the newspaper is put, tracks the position of the finger and the users receives an acoustic description in real-time as they move around the page. In a further extension [18], the application allowed users to create "bookmarks" within the page by placing pins to locations into which the users were guided by sonification of the current position of the index finger.

HCI for the People with Motor Difficulties

People who can not use the regular PC peripherals, such as the mouse or keyboard, are bound to use some alternative means of interaction. In our group, we investigate the benefits and constraints of the acoustic modality, especially the use of vocal input in HCI. We are particularly interested in the use of non-verbal sounds produced by the vocal tract of the user, such as humming or whistling.

The potential of the non-verbal sounds as well as non-verbal components of speech ("err", "uhm") has been taken into consideration only recently by the research community. The goal of this research is to evaluate possible scenarios of control of the user interfaces by means of interaction through sounds other than speech, produced by the user's vocal tract. These methods may be *indirect*, by emulating common peripheral devices, such as movement of a mouse cursor [15, 10] or keyboard [16], or *direct*, by mapping non-verbal sounds to the desired response of the application, such as movement of a game [9, 17] (see also Fig. 2).

As compared to the speech recognition, the non-speech paradigm can offer several advantages, such as continuous input (as opposed to query—response mode of speech control) or language independence. This research is the result of collaboration with Kurniawan from the University of Manchester.

Project *i2home*

Most often, the design of modern devices, such as mobile phones or remote controls, are driven by the ambition to satisfy users who are already engaged in modern technologies. The goal of the project i2home[1] [25] is to develop home appliances for people with special

[1] i2home is a project funded by the EU 6th Framework Program. The project began in 2006.

needs: Persons with mild cognitive disabilities, visually impaired, and the older. The implementation is based on the Universal Remote Control standard [26]. The role of our research group in this project is the user-centered research, design, and evaluation of user interfaces for the older people.

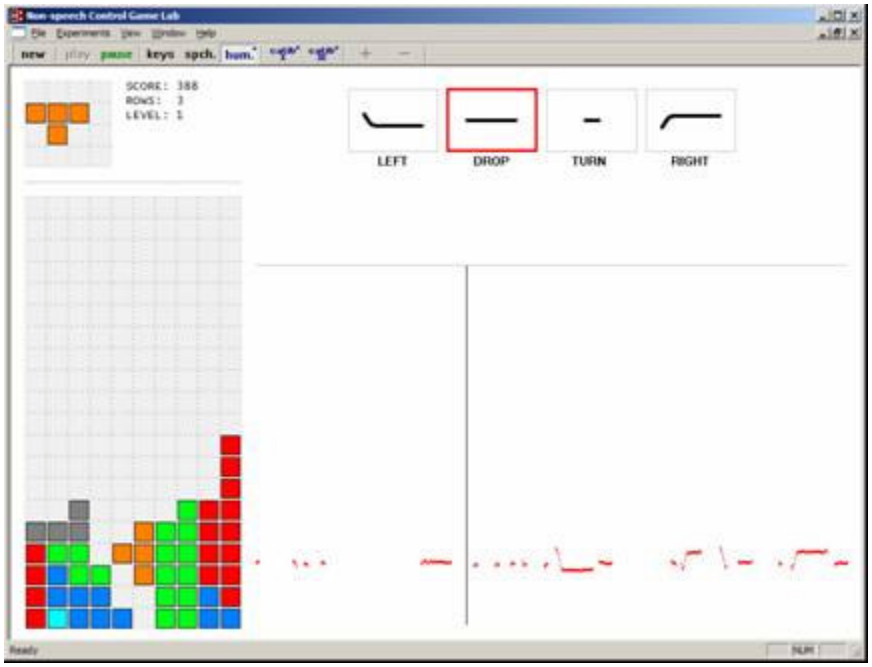

Fig. 2: A screenshot from the NVVI-controlled game of Tetris. The red lines by the bottom of the image visualize the melody of the input sound signal.

Collaboration with Industrial Partners

Sun Microsystems. In a response to the increasing demand of the accessible applications, we have established collaboration with the xDesign Team at Sun Microsystems. The aim of our activities is to improve the accessibility of the Java-based platforms and applications. We focus on facilitating the development of accessible applications in Java as well as making accessible the programming environment *itself*. Specific goals of this collaboration are:

- To build a tool that supports programming accessible applications based on the NetBeans platform.
- To allow the visually impaired people customize the NetBeans IDE.

This collaboration has a form of independent projects that are carried out by the students in the HCI-related courses. The students are supervised by our faculty members as well as the designers at Sun Microsystems.

IBM—CTU Student Research Projects [24]. The contest Student Research Projects is an event held each semester since winter of the academic year of 2005/2006. The contestants are the students of the Department of Computer Science and Engineering who work on projects that are assigned and supervised in cooperation with Voice Technologies and Systems Division of IBM Czech Republic. The projects are mainly focused on the use of the speech recognition and synthesis and represent an opportunity to get a hands-on experience of the latest IBM speech technologies. Many projects were aiming at using the speech as means of increasing accessibility for some motor-impaired users, such as the following:

- **Skype Via Voice** – a simple tool allowing control of basic functions, such as placing or receiving calls, through the speech modality.
- **VoiceStein** – a speech-controlled adventure game (see Fig. 3)
- **Voice control of a radio-controlled car –** series of application allowing the user to control a car by speech commands or by melody of the non-verbal sounds.
- **Google Maps with ViaVoice –** voice-enabled tool for browsing Google Maps.

Fig. 3: VoiceStein Screenshot

Training and Networking Activities

The HCI researchers and students at the CTU are active participants in the Czech SIGCHI chapter, established in 1998 with the main goal to get together researchers, practitioners, and students active in the field of HCI in the Czech Republic. The founding members of the chapter were the Czech Technical University in Prague, dobryweb.cz, and Sun Microsystems Czech Republic.

Since 2005, the Czech SIGCHI group organizes regular lectures for the members of the public interested in HCI. There are usually six lectures a year, one of which is related to the problems of accessibility. The archive of the program of the gatherings can be accessed at [22].

The chapter has also joined the World Usability Day movement. The topic of our WUD 2006 meeting in Prague was the Usability and Accessibility of the Web. Our invitation was accepted by the speakers from academia as well as from the important HCI-related industrial bodies.

Conclusion

This paper has presented a basic overview of the HCI activities related to the assistive technologies that are carried out in the HCI group of the Czech Technical University in Prague. Over the past years, the HCI group of the Czech Technical University in Prague has established its position in the European research space. With increasing importance of the assistive technologies in general, the involvement of our group in their research takes up ever-growing part of our HCI activities.

What we find very important is that more and more students each year take part in the research and development in the field of assistive technology. This year, about 80 students

have participated in the projects that were supervised in collaboration with IBM and Sun Microsystems. Our HCI group thus helps to expand the community of IT professionals who will be aware of the accessibility issues in the Czech Republic in their practice.

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Adam J Sporka is a researcher and a senior-year PhD candidate at the Czech Technical University (CTU) in Prague where he also received his master's degree in computer science. In his research, he focuses on the non-verbal vocal input for emulation of input devices of personal computing equipment. He wrote or contributed to about 20 papers and articles published in scientific journals and proceedings of various international conferences. He was one of the organizers of a first workshop on non-verbal vocal interaction at the ACM CHI 2007 conference. His current appointment is a researcher of the EU 6FP project *i2home*. He is also a freelance consultant in HCI and software development. His clients include Czech Academy of Sciences and Prague Philharmonic Choir.

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Pavel Slavík is a full professor at the Department of Computer Science and Engineering at the CTU in Prague, where he received his PhD (1983), Associate Professor (1994), and Professor (2003) titles. His wide range of interests includes computer graphics, scientific visualization, graphic user interfaces, and interfaces for users with special needs. He is an author or co-author of more than 200 scientific papers and articles in journals and conference proceedings. He has an extensive record of participation in various research projects, including INCO projects (WISE/E 1995-96, Virtuos 1998 – 2000), or 5th Framework projects (ENORASI, 2000 – 2001, MUMMY 2001 – 2005, i2home)

Call for Participation: ASSETS 2007 – Tempe, Arizona

Enrico Pontelli

General Chair

Introduction

On behalf of the organizing committee, I am pleased to invite you to participate in the Ninth International Conference on Computers and Accessibility (ASSETS 2007). The ASSETS series of conferences explores the potential for Computer and Information Technologies to enhance the lives of individuals with disabilities and those around them.

ASSETS is the premier forum for presenting innovative research on the design and use of both mainstream and specialized assistive technologies to support people with disabilities. Over the past few years, the conference has grown and has attracted submissions and participants from all over the world. Since 1994, the Association for Computing Machinery (ACM) and its SIGACCESS Special Interest Group on Accessible Computing have sponsored the ASSETS series of conferences.

ASSETS-2007 will take place in sunny Tempe, Arizona, from October 14 to October 17, 2007. The conference will feature a wide range of activities, including:

- technical paper presentations
- posters and system demonstrations sessions
- a whole-day doctoral consortium
- ACM student research competition

The single track and friendly atmosphere make ASSETS the ideal venue to meet researchers, practitioners, developers and policymakers to exchange ideas, share information, and make new contacts. Students, at any stage of their studies, interested in issues of information technology and accessibility, are particularly encouraged to consider participating in this event. Posters, demonstrations, the research competition, and the doctoral consortium offer exciting opportunities to showcase student work, to receive feedback from world-renowned experts in the field, and to establish contacts and collaborations. Reduced registration rates have been provided to facilitate student participation.

Presentation Topics

High quality, original work on topics relevant to computers and accessibility will be presented at ASSETS-2007. This includes the use of technology by and in support of:

- individuals with hearing, sight and other sensory impairments
- individuals with motor impairments
- individuals with memory, learning and cognitive impairments
- individuals with multiple impairments
- older adults

The work presented will be wide-ranging, including novel ideas, empirical work, designs, techniques, systems, tools, evaluations, scientific investigations, methodologies, social issues or policy issues relating to:

- assistive technologies that improve day-to-day life
- assistive technologies that improve access to mainstream Computer and Information Technologies

- innovative use of mainstream technologies to overcome access barriers
- accessibility and usability of mainstream technologies
- identification of barriers to technology access that are not addressed by existing research

Further Information

For up-to-date information, please visit the ASSETS-2007 web page at:
http://www.acm.org/sigaccess/assets07/

For information on the conference venue, accommodation and attractions in Tempe, Arizona, please visit http://www.acm.org/sigaccess/assets07/accommodations/index.php

Contact Information

If you have any further question or inquiry, please contact ASSETS-2007's General Chair at:

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