1st Peach Summer School Program
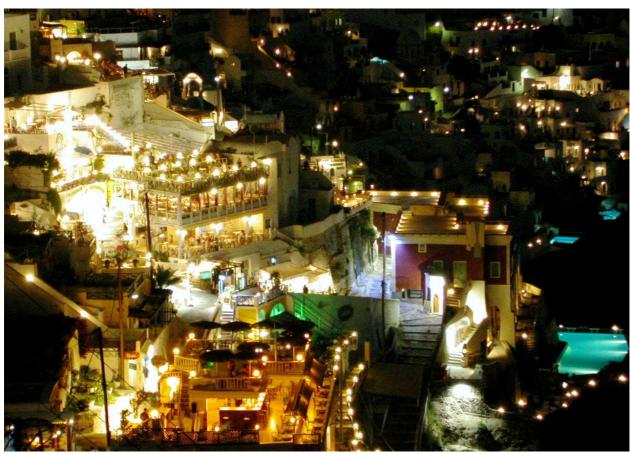

"Presence: towards human machine confluence"

4th to 6th July 2007,

Santorini, Greece

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Useful phones...

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Urgent issues...

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Summer School Committee

General Chairs:
Dr **Dimitrios Tzovaras**, CERTH/ITI, Greece
Dr **Giulio Ruffini**, Starlab, Spain
Dr **Igor Panzic**, FER, Croatia

Special Sessions Chairs:
Dr **Rod McCall**, Fraunhofer, Germany
Dr **Claudia Redaelli**, ITIA, Italy
Mrs **Christina Martin**, Starlab, Spain

The Summer School Program in Brief

	Wednesday 04/07/07	Thursday 05/07/07	Friday 06/07/07
08:30-9:00	Registration & Welcome		
09:00-10:00	The Cyborg, the Self and the Other	The Concept and Assessment of Presence in Virtual Environments	Augmented Reality Games-extending virtual games into real life
	John A. Waterworth	Mel Slater	Wolfgang Broll
10:00-11:00	Rational principles for the delivery of presence	Uses of virtual reality for the study of the brain and its emergent functions	Neurobiology of Haptics
	Paul F.M.J. Verschure	Maria Victoria Sanchez-Vives	Martyn Bracewell
11:00-11:30	Coffee Break	Coffee Break	Coffee Break
11:30-12:30	Towards the ultimate media experience and why this is related to Presence	Companions and Social Presence	Mixed Reality Experiences in Urban Environments Presence and Beyond
	Doron Friedman	David Benyon	Giulio Jacucci & Rod McCall
12:30-13:30	Physiological Measures and brain-computer interface control in VR	Modes of presence in new mediated environments: their variety and articulation	Touch, Tools and Telepresence: Embodiment in Mediated Environments
	Christoph Guger	Anna Spagnolli	Wijnand IJsselsteijn
13:30-14:30	Lunch Break	Lunch Break	Lunch Break
14:30-15:30	IPCity Session	Methods in Presence and Social Presence Studies. Joining Ethnography and Social Network Analysis. Supported by Pasion IP	Presence and disabled people. Enhancing presence in VR environments for the disabled through haptic interaction.
	Moderators: Wolfgang Broll Rod McCall Giulio Jacucci Markus Sareika	Moderator: Luciano Gamberini Anna Spagnolli Fabiola Scarpetta Francesco Martino Concetta Alberti	Moderators: Dimitrios Tzovaras Evangelos Bekiaris
15:30-16:00	Presence and Artificial companions		EEG based brain-computer interface for cursor control and spelling
	Moderator: David Benyon		Moderator: Christoph Gurger
16:00-16:30	Ultramundum Foundation session	Real-time physiology and media session	Diploma Ceremony
	Moderator: Musso Grandi	Moderator: Doron Friedman	
16:30-17:30	Poster Session	Poster Session	
21:00		Banquet Dinner	

1st Day detailed program

Morning Lectures-
(Dimitrios Tzovaras)

08:30-9:00	Registration & Welcome	
09:00-10:00	**The Cyborg, the Self and the Other** When we don't have the technologies we have become used to and dependent on, we feel at a loss. The loss may feel as if an organ of perception is missing, so that some of the world can no longer be perceived and acted upon. Or it may feel as if a part of unconscious memory has been erased, and we just can't access that information when needed anymore. These are quite different psychological effects which, I argue, reflect the presence mechanism in action. The question to be asked is this: who is acting on the information - the cyborg, the self, or the other?	Professor **John A. Waterworth** (Umea University, Sweden)
10:00-11:00	**Rational principles for the delivery of presence** Virtual reality and, more recently mixed reality are well established technologies that are being introduced in our societies at an ever increasing scale. The core objective of these technologies is to manipulate the experience of a human user in such a way as to shift the locus of presence from the world in which the user is physically embedded to the reality defined by the information to which he or she is exposed. This raises fundamental questions about the cues that can and should be used to induce such a shift in the locus of reality. In this presentation I will present our theoretical work in the investigation of the neuronal mechanisms underlying perception, cognition and behavior and our practical work with large scale human accessible mixed reality spaces. On the basis of these complementary research activities I will propose and analyze a number of concepts that can serve as guiding principles in the delivery and manipulation of presence.	Dr **Paul F.M.J. Verschure** (Institute for Audiovisual Studies, Universitat Pompeu Fabra, Barcelona Catalan Institute for Advanced Studies (ICREA), Spain)
11:00-11:30	Coffee Break	
11:30-12:30	**Towards the ultimate media experience and why this is related to Presence** A review of the vision of futuristic media experiences, as reflected in popular culture, reveals that such media experiences may be directly connected to our body and brain. We will review recent research carried out in connecting virtual reality with a brain-computer interface, and other types of media experiences based on real-time physiology. We will discuss possible applications, methods, and results. We will discuss why this type of research is central to research in presence.	Dr **Doron Friedman** (University College London, UK & Weizmann Inst. Rehovot, Israel && The Interdisciplinary Center, Herzliya, Israel)
12:30-13:30	**Physiological Measures and brain-computer interface control in VR** Physiological measures like ECG, respiration and galvanic skin response allow to investigate experimental scenarios in Virtual Environments. Heart-rate, heart-rate variability and event-related heart-rate parameters are explained and their usage will be discussed. The usage of a brain-computer interface for the control of a VE will also be explained.	Dr **Christoph Guger** (Gurger TechnologiesOEG)
13:30-14:30	Lunch Break	

Afternoon sessions-
(Claudia Redaelli)

14:30-15:30	**IPCITY Session** **Interaction and Presence in Urban Environments** Duration 60' The session will introduce a set of tools and demonstrators from the IPCity project. Participants will gain a first hand experience in using some of the mixed reality tools and systems developed. Urban Mixed Reality for Consent Consent is the overall goal in the Urban Planning Process. In order to achieve consent, the integration of many varying points of view is needed. Mixed Reality Technology enables a high bandwidth for the exchange of information which is communication between individuals. This is the basis for collaboration leading to consent among the individual participants. The intention of the Urban Sketcher application is to enable and support this process. Multimodal interaction in real time allows to share a vision by mixing the physical reality (captured by a camera) with virtual content. The envisioned reality from each inter-actor is mixed in a single view which is projected onto a screen and can therefore be perceived by many. This leads to interactive presence experience. Moderators: Dr Wolfgang Broll, (Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Germany) Dr Rod McCall (Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., Germany) Dr Giulio Jacucci (Helsinki Institute for Information Technology, Finland) Mr Markus Sareika (Technische Unversität Graz,Austria)
15:30-16:00	**Presence and Artificial Companions** Duration 30' A follow-up session on Presence and Artificial Companions Moderator: Professor **David Benyon** (Napier University, UK)
16:00-16:30	**Ultramundum Foundation session** **How to create worlds: 3D planets explorable down to ground level with high details on consumer hardware** Duration 30' Until today, only portions of cities or small towns have been modelled with 3D interactive technologies, due to the prohibitively huge amount of data to process to generate a three-dimensional model of an area with hundreds of thousands of buildings. A planet like Earth, explorable in real-time on a consumer low-cost PC has been created in some applications, but the level of detail in the urban areas cannot be high. Thanks to the UltraPeg technology, Ultramundum offers an interactive fly on large cities (one million ihnabitants+) and allows for a descent to ground level in any street to walk among the buildings. The ground is a true portion of an entire planet, explorable in the same environment. The technologies behind this level of performance as well as methodologies to automatically create this kind of products from existent data will be presented by Ultramundum Foundation. Moderator: Mr **Musso Grandi** (Public Relations representative, **Ultramundum Foundation)**
16:30-17:30	**Poster Session Day 1** (program follows)

2nd day detailed program

Thursday 05/07/07		
Morning Lectures **(Giulio Ruffini)**		
09:00-10:00	**The Concept and Assessment of Presence in Virtual Environments** From the first moment that someone puts on a head-tracked wide field of view head-mounted display or enters into an enclosing projection based system such as a Cave, there is a qualitative change in our perception of where we appear to be, and the potential for action there. This talk will concentrate on this transportation of the sense of where our body is located, in virtual reality - the concept of presence. How this qualitative change manifests itself in practice, ways of eliciting it, and ways of assessing it will be the main focus of this talk.	Professor **Mel Slater** (ICREA-Universitat Politècnica de Catalunya, Barcelona, Spain)
10:00-11:00	**Uses of virtual reality for the study of the brain and its emergent functions** From the perspective of a neuroscientist, Dr Sanchez-Vives will discuss different applications of virtual reality and the presence that it engenders for the study of the brain structure and its functions: using VR to interact with individual brain neurons, or to understand the processing of spatial information or body perception are just some of the possibilities of virtual environments to understand how the brain views the world and ourselves. The possibility that presence is a restricted form of "consciousness", the main and most intriguing emerging property of the human brain, will be presented for discussion to the participants to the course.	Dr. **Maria Victoria Sanchez-Vives** (Instituto de Neurociencias-CSIC, Universidad Miguel Hernández, Alicante, Spain)
11:00-11:30	Coffee Break	
11:30-12:30	**Companions and Social Presence** The next few years will see advances in artificial companions. These include interfaces that help people, but that typically utilise some anthropomorphic designs to suggest people are interacting with other people. The sense of presence this evokes can be significant in changing interactions into relationships. In this talk we explore issues of social presence and co-presence with artificial companions	Professor **David Benyon** (Napier University, UK)
12:30-13:30	**Modes of presence in new mediated environments: their variety and articulation** The lecture underlines the peculiarities of presence as a perspective on the human relation with technologies. It presents research approaches that do not aim at measuring the level of presence, but at identifying the specific modalities of presence made available by each technical medium, emphasizing action as the analytic focus. The theoretical and methodological foundations of these approaches will be considered, and empirical studies of various kinds of mediated presence will be discussed, including those involving large networks of users.	Dr **Anna Spagnolli** (University of Padua, Italy)
13:30-14:30	Lunch Break	

Afternoon sessions
(Igor Padzic)

14:30-16:00	**Methods in Presence and Social Presence Studies. Joining Ethnography and Social Network Analysis**
	Duration 90' The workshop introduces scholars to social presence research offering a panoramic view on previously existing methods and analyzing new approaches rising from current EU projects. Workshop will be divided in two sessions.

Plenary session	**Parallel session**
The first session (from part 1 to part 4) will be plenary and devoted to elaborate the concept of augmented communication and to in depth analyze the role of the Presence in Social Network Activities. 1. Introducing augmented social presence: feel present in augmented communication environments 2. Presence in social interaction: from dyadic relationship to large networks 3. New social presence technologies: Mobile Tech, WEB 2.0, Augmented Communication devices 4. From Ethnography to SNA; integrating qualitative and quantitative methods in presence research	The second session will be organized in 3 parallel parts created to introduce audience (20 people each more or less) in new methodology for studying the modes and structure of Presence. 1. Methods Parallel Part 1 Structured video and discourse analysis 2. Methods Parallel Part 2 Behavioral Indexing (Eye tracking and Human-Interface Events) 3. Methods Parallel Part 3 Social Network Analysis

Moderators:

Professor **Luciano Gamberini**
Dr **Anna Spagnolli**
Mrs **Fabiola Scarpetta**
Mr **Francesco Martino**
Mrs **Concetta Alberti**
(Human Technology Lab. – Dept. of General Psychology, University of Padua, Italy)

16:00-16:30	**Real-time physiology and media session** **Computational Biofeedback: A simple hands-on experience** Duration 30' How low-cost sensors will be presented, measuring heart rate and galvanic skin response, can be easily integrated into a very wide range of applications. The possibilities for constructing new types of experiences based on real-time feature extraction from these signals will be discussed. Some simple examples will be presented; see how we can change parameters and conduct experiments, and how we can analyze the data. Moderator: Dr **Doron Friedman** (University College London, UK & Weizmann Inst. Rehovot, Israel && The Interdisciplinary Center, Herzliya, Israel)
16:30-17:30	**Poster Session Day 2** (program follows)
21:00	**Banquet Dinner- Selene Restaurant** www.selene.gr

3rd day detailed program

Friday 06/07/07

Morning Lectures
(Christina Martin)

09:00-10:00	Augmented Reality Games - extending virtual games into real life This lecture will focus on the design and development aspects of the realization of pervasive outdoor augmented reality games. This includes an overview of related technologies and their use within such games. Based on different existing AR games, specific implementation issues will be discussed and further elaborated.	Dr **Wolfgang Broll** (Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.)
10:00-11:00	**Neurobiology of Haptics** Review of the basic neuroscience underlying haptic perception. The lecture will include a review of the anatomy and physiology of the peripheral and central nervous systems for somatosensation. I shall review recent evidence from human and animal studies on the higher cortical mechanisms underlying haptic perception.	Dr **Martyn Bracewell** (Universities of Birmingham and Wales,UK)
11:00-11:30	Coffee Break	
11:30-12:30	**Mixed Reality Experiences in Urban Environments:** **Presence and Beyond** To address mixed reality experiences and presence in urban environments the lecture shows the limitations of telepresence research proposing studies on awareness, and cultural-historical activity theory. To create a conceptual map for the design and evaluation of mixed reality applications these concept are integrated with urban studies and examples from the arts. This conceptual map proposes relevant aspects of mixed reality presence and experience in urban environments: the spatial, temporal, material, and social aspects of presence that need to be taken into account; users' activities; as well as how the design components – the medium, the content, and the user interface, including the possibilities of composing and configuring – may influence the experience of presence. This concept map reflects scenarios in urban renewal, storytelling, gaming and large scale events experiences. **Sense of Place and its contribution to mixed reality presence research** Sense of place shapes a large amount of our daily lives from which routes we chose to take to work, through to how we behave in churches and other locations. It is a complex phenomenon and at a basic level can be broken down into physical properties, activities and the meanings we attach to a location. It can also be considered from how we relate to others and the wider environment. Regardless of which model of place that is explored it remains a complex interplay between many elements and its dynamic nature means that place is a constantly evolving phenomenon which is based on current and past events. Yet despite its relevance to mixed and virtual realities its core concepts remain secondary in the eyes of many when taken in relation to the sense of presence. This talk will explore the key aspects of place by providing some real life examples and will also look at how to consider place related issues when designing or evaluating mixed and virtual reality environments.	Dr **Giulio Jacucci** (Helsinki Institute for Information Technology, Finland) Dr **Rod McCall** (Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.)
12:30-13:30	**Touch, Tools and Telepresence: Embodiment in Mediated Environments** We tend to think of our body image as fixed. However, human brains appear to support highly negotiable body images. As a result, our brains show remarkable flexibility in incorporating non-biological elements (tools and technologies) into the body image, provided reliable, real-time intersensory	Dr **Wijnand IJsselsteijn** (Eidhoven University of Technology, The Netherlands)

	correlations can be established, and the artefact can be plausibly mapped onto an already existing body image representation. In my talk, I will take our current work on the virtual rubber hand illusion to illustrate these points and will outline some future directions for the design of mediated environments with the body in mind.
13:30-14:30	Lunch Break

Afternoon sessions
(Rod McCall)

14:30-15:30	**Presence and disabled people** **Enhancing presence in VR environments for the disabled through haptic interaction.** Duration 60' Dr. Bekiaris will present results and demos of the tools developed in the ASK-IT project for providing novel ubiquitous and personalized services to the disabled. Focus will be on the links of this work to presence research, i.e. participation to communities, ubiquitous aid provision and service provision while on the move. Dr. Tzovaras will present results and demos from the latest developments of the Augmented and Virtual Reality Laboratory of CERTH/ITI in the area of presence and disabled people. Demos will include: a) a virtual environment for the training of the blind and the visually impaired and b) a multimodal (haptic-aural) VR interface for accessing conventional 2D maps. Moderators: Dr Evangelos Bekiaris, (Research Director, Hellenic Institute of Transport, Centre for Research and Technology Hellas) Dr **Dimitrios Tzovaras** (Researcher Grade B, Informatics & Telematics Institute, Centre for Research and Technology Hellas)
15:30-16:00	**EEG based brain-computer interface for cursor control and spelling** Duration 30' An EEG based brain computer interface allows to analyze brain waves in order to control external devices. At the workshop people can try to write words and sentences and to control a cursor on the computer screen. The EEG recordings, the real-time analysis and the classification methods will be explained. Moderator: **Dr Christoph Gurger** (Gurger Technologies OEG)
16:00-16:30	Diploma Ceremony The diploma ceremony is just to provide the students with a prove-attestation that they have attended the summer school, attendees who depart on the 6th afternoon are not required to attend this ceremony.

Day 1-
Wednesday 04/07/07

1. Improving Magic Mirror Sense of Presence

Raffaella Pellegrini , raffyw@yahoo.it ; Interactive Media Institute Belgium

The Magic Mirror is an Augmented Reality device designed for filling in the gap in trial process of customized shoes. It generates a virtual image of the shoe and overlaps it on the customer foot, following his movements and allowing him to see the results in a screen, such as in front of a real mirror. During the development of the technology, some studies were carried out in order to improve the sense of presence, in particular refining the pictorial realism of the 3D shoe models, broadening of the range of actions allowed by the tool and synchronizing the real movement with the virtual one.

2. Objective Presence Measures through Electric Brain Activity

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The Educational Approaches to Virtual Reality Technologies Laboratory, EARTHLAB, The University of Ioannina, Greece

The goal of our study is to give data coming from objective measures concerning some factors that are related with the sense of presence in Educational Virtual Environments (EVEs). The research is in accordance with findings showing that electroencephalography (EEG) can be used to probe the relation of hemispheric functioning to both emotion and cognition.
Only a few studies report results on brain activity in virtual worlds that may lead to conclusions concerning presence. Of course we are far away from being able to have an identification of the sense of presence using brain activity. However, there are some psychological dimensions that are related to the phenomenon of presence such as attention and selective attention, awareness of the environment, space perception and orientation, the role of working memory, mental workload, emotional states and many others. Some of them can be described by EEG measurements and they can be used to supplement the information which caused by other objective and subjective measures.
Our aim is to detect if sensory, realism and distraction factors that are related with presence result on differences in electric brain activity, indicating attentional activity and visual awareness as a virtual environment is enriched with textures and objects. Our results provide indications that factors related with the sense of presence in virtual environments affect electric brain activity.

3. Presence and avatars in Educational Virtual Environments

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In this work we intend to illustrate the general plan and various parameters of our research that starts now and will result in a Ph.D. We intend to create an Educational Virtual Environment (EVE) that will involve learning activities that the user will have to complete in limited time. The activities may be related to:
- puzzles
- math concepts
- physics experiments
- flowchart design
- way finding.
We also intend to create an animated pedagogical agent that will be integrated in that EVE. The agent's purpose will be to enhance social presence that is needed for learning and is usually missing in computer-based learning environments. The agent will intervene in the learning activities in two ways:
- On a cognitive level, the agent will provide knowledge and advice in order to help the user complete the activities, improve their understanding of the problem and increase their meta-cognitive abilities. - On an affective level, the

agent will provide empathy, motivation and encouragement to the user through verbal and non verbal (facial expressions, gestures) communication.

The intervention of the agent will be based on the progress of the user in the learning activities. As an option we are thinking of including the emotional state (stress) of the user as an additional means of controlling the timing of the interventions. The emotional state will be extracted from physiological parameters of the user (skin conductance, heart rate, respiration etc).There will be three or four versions of the EVE:
1. One with the plain learning activity (no pedagogical agent)
2. One including the pedagogical agent intervening on cognitive level only
3. One including the pedagogical agent intervening on cognitive and affective level
4. One including the pedagogical agent intervening on cognitive and affective level, taking also into account the emotional state of the user (physiology indicating stress).
The hypothesis will be that the 3rd or 4th version of the EVE (with increased social presence) will:
- be more interesting
- provide more motivation to the user
- increase the user perseverance to complete the activity
- increase the user's understanding of the activity
- help more users complete the activity and in less time.

4. Being inside the quantum atom

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Students from the advanced high school classes up to the last university years have difficulties in grasping the main notions and principles for describing an atom according to Quantum Mechanics (QM), as they demand an important level of abstraction and a reconceptualization in intellectual activity. According to our research results when students interact with software packages concerning the 3D representations of the atom according QM the learning outcomes are not very promising. This might be because of the piecemeal description of the orbitals and electron clouds given in these visualizations.

In order to overcome the difficulties connected with software packages that have been used as educational tools by now, we take advantage of Educational Virtual Environments (EVEs) characteristics. In this perspective we have created the dynamic EVE "THE QUANTUM ATOM" using 3D Max 5.0 and Virtools Dev 3.0 software. The hydrogen atom was visualized at the ground state and at the first and second excited states according to QM, based on scientific data. This is developed at a desktop VR system supporting immersion and following the theoretical perspective of constructivism. Also, it gives the possibility of first-person point of view, free navigation and interactivity using stereoscopic glasses and involving students in well-designed learning tasks.

An empirical study was conducted with thirty-eight (38) first year students of the Department of Primary Education, University of Ioannina. All the students reported very enthusiastically a sense of presence as a result of free navigation and high degree of interactivity. The learning outcomes were very fruitful as most of them were conducted to assimilate the main principles and notions of QM.

Our next step is to study the relationship of presence and learning outcomes in EVEs involving abstract spatial environments such as the quantum atom to support physics teaching and learning.

5. Social presence and learning outcomes in Educational Virtual Environments

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The University of Ioannina, Greece

The poster will present a research proposal for a PhD thesis, providing information about the intended research project in terms of content and methodology. Main aim of the presentation will be to obtain feedback from experienced key researchers and peers as well.

Educational Virtual Environments (EVEs) are virtual environments that have pedagogical goals, "provide users with experiences they would otherwise not be able to experience in the physical world and redound specific learning

outcomes" . One of the proposed learning or meaning-making theories to support EVEs is social constructivism. According to social constructivism, individual development derives from social interactions within which cultural meanings are shared and eventually internalized by the individual. Seen in this context, research on EVEs might benefit from focusing, also, on the users sense of social presence within EVEs.

Our research intends to focus on social presence in EVEs related to learning outcomes. It seems that (social) presence is a unique phenomenon which arises when a user interacts with a mediated environment. If the environment is a virtual environment which has pedagogical goals (EVE) and the phenomenon relates to the accomplishment of those goals, then it is crucial to investigate this relation in order to be able to manipulate it (that is what pedagogues usually do!). Our main research question will be: How does social presence in an EVE affect users' learning? In order to conduct our research we plan to: (a) develop or adopt and tailor a measure for social presence in EVEs, (b) find out how to "manipulate" social presence by determining the factors that underlie it, (c) design an immersive EVE with a transparent pedagogical goal which should lead to measurable learning outcomes, (d) develop different versions of the EVE which would elicit different levels of social presence, (e) conduct main research with large sample. Our null hypothesis will be that social presence in EVEs correlates positively with learning outcomes.

6. Interactive multimedia chronicle: from soundscape to audiovisual experience

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Jonatas Manzolli*, Sylvain Le Groux[#], Zenon Mattew[#], Lucas Zimmerli[#], Ulysses Bernardet[#] and Paul Verschure[#&].

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Institute of Audiovisual Studies (IUA) & Foundation Barcelona Media, Universitat Pompeu Fabra, Barcelona, Spain
[&] Catalan Institute for Advanced Studies (ICREA)
*Interdisciplinary Nucleus for Sound Studies (NICS) University of Campinas (UNICAMP), Brasil

We have previously presented a large-scale interactive exhibit called Ada that exposed its 560K visitors to an artificial creature that was embedded in the physical structure of the exhibition building. Hence, Ada had a focal narrative that was given coherence through the notion of Ada as an ambient sentient being that could be encountered and explored. We are currently extrapolating from the focal narrative of Ada towards an interactive emergent narrative that will arise from the interaction of physically present humans, remotely present humans, fully synthetic characters and an ambient intelligence in mixed reality. Given the technical and conceptual complexities of this experiment we have rephrased the challenge of producing a mixed reality interactive narrative in terms of a mixed reality performance called re(PER)curso. re(PER)curso is an artistic framework to implement interactive procedures that will be used in the physical installation called XIM (eXperience Induction Machine) that provides a gateway to the, so called, persistent virtual community (PVC).

Re(PER)curso uses two human performers (a percussionist and a dancer), multimedia, virtual reality and mixed reality technology to present a narrative that focuses on the assigning of meaning and to experience from multiple perspectives. Overall, the 40 minute performance integrates, narrative, music and dance that will interact and fuse with real time computer generated, animated characters, landscapes and projections of real time generated images. The performance is organized in four main scenarios: Prologue, Elements, Dance and Epilogue. Each scenario is supported by a number of input devices in particular the visual active tracking of the ongoing performance, a number of drum carpets that are interfaced to midi devices, microphones, vision, drum carpets, and controllers such as the synthetic composition engine RoBoser for interactive real-time sonification, and an accurate and robust tracking system for a reliable tracking of the dancer movements. The character of the avatar and its environment will be a key interpreter, mediator and/or initiator of this mixed reality dimensions (performance). In this contribution the procedures put in place to support mixed reality performance will be further described and the first results based on our intensive rehearsals analyzed.

7. Embodied cognition and emotion in multisensory media

Ana Tajadura-Jiménez, ana.tajadura@chalmers.se ; Division of Applied Acoustics, Chalmers University of Technology, Sweden

Supported by PRESENCCIA

Emotions underlie most events in our everyday life perception. They prepare ourselves for an optimum response to these events, either showing attraction or rejection to them. Likewise, media has the power to evoke in us similar affective processes as the ones created by real situations. This research investigates the role of emotions in media experiences, particularly, from a perspective of embodiment. The concepts of embodied cognition and embodied emotion emphasize the idea that the body is strongly connected to the information processing in the brain. In line with this theory, the present research addresses human responses to stimuli associated with a person's own body (self representation sounds, e.g. heartbeat) or stimuli that occurred in a peripersonal space. The presented studies focus on auditory-induced emotions even though contributions of other sensory modalities (visual, vibrotactile) to the affective media experience are also considered. Human affective responses are accessed from different perspectives and combining different methodologies (self-report, behavioral and physiological measures). In addition, the influence of personality traits on the media experience is being investigated. Results suggest that stimuli resulting in the increase of body awareness might increase emotional experience and vice versa

8. Perceptual optimization of dynamic audio-visual media

Aleksander Väljamäe, aleksander.valjamae@chalmers.se ; Chalmers University of Technology, Sweden

Supported by PRESENCCIA

Virtual Reality (VR) research gradually shifts focus from pictorial to perceptual realism where the optimization of media synthesis and reproduction technologies is based on end-user's subjective or objective responses. Research shows that strong spatial presence responses can be evoked in a virtual environment using a reduced amount of sensory information. These situations can be feasible because of the synergistic and compensatory mechanisms of the human multisensory perception.
Selected results will be presented from the recently finished the EU project POEMS (Perceptually Oriented Ego-Motion Simulation) which explored multisensory interaction effects in the optimization of motion simulators. Self-reported presence and illusory self-motion ratings were used to determine and evaluate most instrumental ecological acoustic cues in presented audio-visual or purely auditory scenes. Continuing perceptual optimization research in the PRESENCCIA project, recent psychophysical studies will show how sound can compensate temporally degraded visual motion.

9. Narratives in immersive technologies

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Supported by PASION

The main goal of this project is enhance the possibility of developing narratives within immersive technologies. An important part of the research is concerned with the question of how a script can be written, annotated and realized for an immersive context.

10. Spinoff – Transferring Energy between Real and Virtual Worlds

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Mette Ramsgard Thomsen ; CITA – The Royal Danish Academy of Fine Arts, School of Architecture

Supported by PRESENCCIA

There is a widening gap between interaction devices for Virtual Environments and other factors such as graphical realism, accessibility and complexity. To address this problem, we developed a Mixed Reality environment that allows participants to interact with virtual entities using an existing toy – a Hula Hoop. In a subsequent user study we attempted to correlate the use of real artifacts as input devices towards increased interactivity.

11. Designing for integration: interaction design intervention in an external public space

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How should we integrate interactive artifact with this setting? This was the main question we had in mind when we started with our field studies to explore opportunities for interaction design intervention in the Milk Market, a farmer's market in Limerick city. The Milk Market in Limerick city in Ireland is a historic external public space that remains in use for over 150 years. The market is a very popular public space that brings in people of all age groups for a variety of reasons. A number of stalls in the Milk Market sell variety of quality food ingredients, which are very popular amongst people here.

The question of 'integration' was informed by my background in architecture practice where integration of a new building in an existing public space is the primary objective of the design process. A number of approaches in architecture advocate minimal design intervention and emphasize on creation of a harmonious relationship between the new building and its setting. Concern for integration of new artifact with its setting can also be seen in literature of interaction design. Suchman's (1994) proposed artful integration approach that emphasizes that any new element to be introduced in a setting needs to be made up out of reconfigurations and extensions to familiar existing environments, creating a harmonious relationship between the designed artifact and environment of its intended use.

The design concept - the Recipe Pyramid – was envisaged as a medium for people to share recipes amongst each other and with a wider audience. The motivation for concept was informed by everyday spontaneous discussions amongst people about food and recipes in the market and lack of any mechanism to capture knowledge exchanged during such discussions for benefit of a wider audience.

The content for the recipe centre was developed by contribution of recipes from everyone visiting the market. People could access recipes submitted by a number of other visitors to the market by using an 'ingredient card', an RFID tag, made available at the recipe station as well as at some of the stalls in the market. Each recipe print out included names of the contributor(s) and in this manner, all such people were 'present' at the Recipe station, even though they were not directly involved in the process of interaction.

The Recipe Station was installed in the Milk Market for 5 weeks and evaluated. Our evaluation showed that the visitors to the market were positive about the idea of sharing their recipes with others in their absence and we received a number of submissions during our presence in the milk market. Our evaluation also showed that our design approach for physically locating the artefact in the market for use of people and providing them opportunity to build, share and access content with each other worked positively towards integration of recipe centre with its setting, the milk market. The design case study presented in this research is part of the work I have conducted on the SFI Shared Worlds Project currently being carried out by the Interaction Design Center, University of Limerick, Ireland.

12. Diasporic Communities: Increasing the Sense of Connectedness to their Hometowns

Luis A. Castro, Luis.Castro@postgrad.manchester.ac.uk ; School of Informatics, The University of Manchester, UK

The continuous migratory flows from Mexico to the US have yielded the creation of transnational communities, which are formed by people with strong connections to their hometowns. Keeping in touch is essential for these people to keep track of local events and maintain certain levels of awareness on their family and hometown. Despite the recent advances on Information and Communication Technologies, the community context obtained by migrants is constrained by the ability, availability and willingness of the conveyer. This work aims to increase the migrants' sense of connectedness to their hometowns by expanding their communicative repertoire (e.g., 24/7 live video cameras). Moreover, there is a particular interest on studying the influence of awareness and presence on the levels of homesickness experienced by migrants. One of the main challenges is to increase the sense of connection to places (e.g., hometown) rather than people (e.g., family). This work faces particular challenges as it is difficult to measure levels of connectedness, awareness and presence and to asses the extent to which one influence the behavior of the other.

13. Geodesic Polar Representations for 3D Face Recognition

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Efficient handling of the non rigidity of the facial surface can significantly improve the performance of automatic 3D face recognition.
Using a geodesic polar parameterization of the face surface, the intrinsic surface attributes do not change under isometric deformations and therefore this representation is appropriate for expression invariant 3D face recognition. The special case of an open mouth that violates the isometry assumption is addressed using the concept of the shadowed area that also leads to an invariant representation.
3D face recognition is reduced to classification of expression compensated 2D images where a wealth of state-of-the-art classification techniques can be applied.
Experimental results demonstrate the superiority of our algorithm.

14. A talkative presence answering questions and describing the world

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A huge part of the WWW is stored in databases in forms that aren't easy to understand by an average user. There is extended use of mark up languages like OWL that is easily comprehended by an agent, but not by a human. We have created a system that can generate descriptions of entities, whose features are stored in an OWL file. The texts that the system generates can be in a number of different languages. Also the system can generate comparisons between the entity that it is being described at the moment and entities which have been already described. In our demo we have implement this system for a collections of archeological artifacts.
 Another problem of the WWW is the amount of information that it contains. Seeking information about something is pretty easy, but finding specific answers to questions is a very difficult problem. We have developed a question answering system that is capable to answer person definition questions, by retrieving information from the archives of a newspaper. To achieve that, we use Support Vector Machines and features that are automatically chosen.

15. Bio-Metric Computer Interface

__Jorge Arroyo Palacios__, j.arroyo@dcs.shef.ac.uk, University of Sheffield, UK

Presence, the sense of being in the Virtual Environment is a key factor in the creation of effective and profitable virtual reality applications. Despite its essentiality there are two fundamental problems: 1) how this subjective feeling can be objectively measured, and 2) how to control presence.
My research work studies the change in sympathetic and parasympathetic activity during Virtual Reality exposure as an approach for objective corroborative presence measurement and real time auto-calibration of variables in a Virtual Environment.
In the first year of research three physiological measures have being considered for the identification of sympathetic and parasympathetic activity: heart rate, spectral analysis of Heart Rate Variability and Skin Conductance. The first experiments of the project focused in the evaluation of stimulus induced to different participants by two different media sources: audio and video. The audio and the video stimulus were taken from a thriller from the 1970's. The evaluation of particular events is based on the physiological reactions produced on participants and in the consistency with the sympathetic or parasympathetic activity the stimulus should arouse.

16. 3D Gestural and Tacticle Interaction Techniques to Handle Multimedia Ambient Environmernt

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__Eric Lecolinet__, Ecole Nationale Superiure des Telecommunications(ENST), France

An ambient intelligent environment consist of variety of devices, services, media and data. Controlling heterogeneous sees of these devices together is one of the main issues in such environment. The other issues include managing the large amount of data as s list of hundreds of TV channels, the list of favourite songs and variety of basic functionality offered by these devices, in a fluid and natural way.
We present two types of techniques, 3D Gestural interaction and tactile interaction. These techniques control different multimedia devices and related data. We use 3D gesture techniques based on ARToolkit to control navigation and selection in the list. We also present a custom built remote control "Tactimote" with tactile feedback, designed for navigating in long lists and catalogues. The results of informal tests confirm the suitability of our techniques.

17. Playing games with any-one/where/time

__Paraskevh Chatzakou__, vivichatzakou@gmail.com ; Athens Uni. Of Economics & Bussiness, Greece

The urge for playing games is a human feature that follows us everywhere and anytime. That is why we developed a multiplayer on line role playing game for mobile smart devices. The user is able to play games with other players, miles away through WiFi or GPRS. He can chat with them, create alliances and organize strategies against the villains of the game, or even against other players. The client application of the game was developed in Java 2 ME, while the server side was written in C# and .Net 2.0.
We also study the idea of creating a whole framework that it would allow players to exchange games through WiFi and GPRS and then let them play one against the other. The framework should be a distributed system that it could keep the statistics of the players.

Basis of multisensory processing in humans: Measuring the effects of translating visual information into auditory information (and vice-versa), and the consequences this may have on presence.

18. Basis of multisensory processing in humans: Measuring the effects of translating visual information into auditory information (and vice-versa), and the consequences this may have on presence.

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While the patterns of light that fall on the eye are in themselves meaningless, recent neuroscience research suggests that the brain continually creates meaning by encoding empirical information about what related stimuli meant for past behavior.
Perception and presence are in this view active processes that embody ecological history. Here we aim to directly test the empirical nature of presence by translating the 2D patterns of light that fall onto the eye from the natural environment ('scenescapes') into 2D 'soundscapes'. As the only information the auditory system of human subjects will receive is the same ambiguous information that their visual system uses to guide behavior, the auditory system will have to learn to disambiguate the visual world. A system has been created that facilitates the translation of still and moving images into such soundscapes, enabling us to quantify for the first time the effects on subsequent perception and presence.
The inverse relationship will be examined by allowing subjects to control a musical performance that is simultaneously reinterpreted as real time synthesized graphics. The effect that closely interacting music and visuals will have on presence can then be measured, both from the viewpoint of the performer and of the audience, while allowing varying levels of interaction, ranging from passive viewing, to user interfaces of varying immediacy. It is expected that performers and audience will as a result of this cross-sensory interactivity develop an altered mode of interpreting multimodal stimuli.

19. Haptic cued attention

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Background: The haptic system informs us about the characteristics of external objects leading to object recognition It is involved in striking, stroking and   painful experience, and it is central in controlling motor acts through the body and limbs. Haptic perception seems to be based on elementary haptic patterns that convey a meaning - a haptic language. Haptic language consists of particular haptic patterns that have a particular meaning, across subjects and across contexts (situations), i.e. haptic interpretation seems valid and consistent. A cued attention task consists of a cue, which provides information on the following target that is in most cases, but not always, accurate. Cue validity effects have been described using behavioral as well as ERP measures in the visual and auditory modalities, but not in the haptic modality.
Aim: To find and describe haptic cued attention. We study here haptic cued attention, in order to examine if it is possible to reproduce, in the haptic modality, cue validity effects (shorter RT to validly cued targets) that have been reported for the auditory and visual modalities.
Methods: The study includes 3 haptic experiments. In all 3 experiments, participants are presented with haptic stimuli through a pen-like stylus. These haptic sensations are similar, and practically identical, to the haptic sensations one feels holding a stick and touching and/or manipulating real objects in the real physical world. Participants respond by pressing one of two buttons on the stylus. In the first experiment, the subject is exposed to haptics in one of 4 directions. In the second experiment, the subject is occupied with haptic stimuli discrimination (up, down, right, left). In the third experiment, the subject is occupied with haptic cued attention task.
Preliminary results: Experiments 1-3 were carried out behaviorally. In experiments 1 & 2, shorter reaction times ($p<0.05$) were found for stimuli in "down" and "left" directions. In experiment 3, shorter reaction times were found after valid haptic cues.
Conclusion and Significance: Cue validity effect was found in the haptic domain. A preferred haptic direction was found. These conclusions may enhance the development of VR haptic systems. Additional experiments are carried and will be carried in the future to assess the interference of emotional stimuli and haptic attention, in a similar paradigm. If possible, ERP experiments will be carried with a similar paradigm to assess the neural correlates of haptics and emotional interference.

20. NeXuS: Augmented Reality Scenarios Through Intentional Agents

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NeXuS represents an intentional agent approach to the development of an augmented reality (AR) framework. By exploiting the properties of a multi-agent system, the NeXuS project team believes that such a system is a natural candidate for the development of a distributed framework for AR application development.

21. Real Man meets Virtual Woman: A Study of Social Anxiety in a Virtual Environment

Xueni Pan, panxueni@gmail.com ; University College London, UK

How will people respond with appropriate affect to virtual social encounters? Will shy people react with anxiety? This research is an experimental study of a virtual environment scenario set up in a CAVE-like system.

22. Ergotic Sounds
A new way to improve Playability, Believability and Presence of Virtual Musical Instruments

Annie Luciani, Annie.Luciani@imag.fr ; IMAG, France

How "ergotic gestural-sound situation" will be explored, i.e. the situation in which the instrumental gesture and the produced sound are intimately energetically liked, is a native way to guaranty the playability, the believability and the presence of the musical virtual instrument. The chosen experimental situation is the evaluation of a difficult musical pattern in a bowed string performance that consists in maintaining the continuity of the sound when changing the bow direction. This pattern is objectively observable on the signals and subjectively identifiable by experts performer and audience.

23. Is technology involved in the presence phenomena?

Eirini Karapistoli, ikarapis@auth.gr ; Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, Greece

With the advent of new technologies, the concept of presence has become an active area of research between different disciplines, from computer science and engineering to psychology and philosophy. According to Lombard and Ditton, presence is defined as the perceptual illusion of non-mediation that occurs when a user fails to perceive or acknowledge the existence of a medium and responds as if the medium was not there. However, one basic distinction among definitions of presence concerns the issue of technology. Some definitions focus on objective properties of communication that explicitly exclude technology. Other definitions explicitly involve the use of technology. And some definitions can apply in either context, when technology is involved or not. The motivation of this study is therefore, to conduct research in an effort to find a possible link between these two concepts.

24. Presence and Physiology: Implications for VR Therapy

Wiederhold K. Brenda, bwiederhold@vrphobia.com ; University of Padua, Italy

Most researchers agree that presence is a crucial part of the success generated by the use of virtual environments in both training and therapy. Presence is often measured by self-report questionnaires, many of which were developed by those in the human factors area. Because of this, many clinicians have found it useful to also measure physiology as an indicator of presence during psychological interventions. Our group has generated data from both the controlled laboratory setting as well as the real world clinical setting indicating the usefulness of applying both subjective and objective measures to the attainment of degrees of engagement during training and therapy. Results from our studies will be highlighted for this poster presentation.

25. PASION: Social feedback effects on presence in a collaborative gaming situation

Martino Francesco, francesco.martino@unipd.it; HTLab, Department of General Psychology, University of Padova, Italy

How does the provision of a social feedback, and to what extent this intervention is able to augment social presence in a certain group involved in a specific task?
The aim of this study is to investigate the specific role of social feedback, extracted upon a determined dimension, in group-mediated activity with augmented communication. Different studies have suggested that the role of feedback can affect some social dimension. This study investigates the effect of providing a group with information such as message exchange and the level of reciprocation achieved by the use of Social Network Analysis (SNA). SNA is a formal theory based on the study of social networks as structured by relations among social actors: social actors are the nodes of the network, and relations as the links among them. SNA can provide valuable tools to describe, visualize and understand the quantity and quality of social relations and to extract relevant patterns among them.
The purpose is to find consequential indexes to be implemented in a communication device that provides constant updates to users. The kind of group activity chosen for the study was an on-line game where players talked to each other via textual chat. Di Micco, Pandolfo and Bender found that displaying information about group activities cause individuals to be more aware of their own behavior, so they to attempt to change it; Morris used SNA displays to find a way to increase elder people self awareness and confidence in the possibility of improving their social life. The experimental setting constructed for our research was an on-line collaborative game in which players talked to each other via textual chat (figure 1).
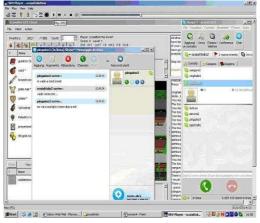

Figure 1. An example of the game used (Crossfire®, freely available at crossfire.real-time.com/). Player were able to chat using Skype ®(www.skype.com)

During the game, users were provided with visualization of a particular dimension of their ongoing activity of communication (figure 2).
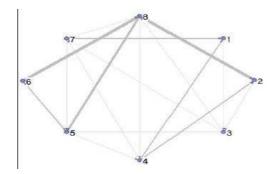

Figure 2. An example of social network.

A previous study of our group has shown that social feedback provided to a network of people is accompanied by an increase in the flow of communication in the network. Not only did the feedback have a decisive influence on the "quantity" of communication acts, as clearly shown by the increased amount of messages, but also on the organization of the communication that became better structured, as emerged from improved symmetry in thread starting communication (that can be considered as a measure of initiative in exchanging information). Finally, the improvements in communication did not interfere with the performance and may also have been responsible for facilitating it.

The effect of different kinds of social feedback during a prolonged session of game will be analysed, using a similar procedure utilised in our precedent study. At the end of the session, a questionnaire will gather information about social presence, i.e. player involvement, perception of team-mates and of hidden social dynamics. So, feedback is not used only as a way to modify people behaviour, but also their social awareness, and the way performance and social presence are related. The study, in fact, will also explore how this feedback could influence user's performance according to task aim, and how the pattern of communication changes according to the specific dimension visualized.

26. PASION: The Contribution Of Eye Tracking Technologies In Presence Studies

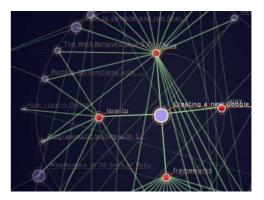**_Alberti Concetta,_** concetta.alberti@unipd.it ; University of Padova, Italy

Social presence is defined as the sense of being with another in a general way. This notion can be more specifically identified with the concept of copresence as the sensory awareness of the embodied other; in this sense social presence is communicated through visual cues like facial expressions, gestures and eye contact. Thereby the sensory channel plays a fundamental role as a medium to experience the feeling of intimacy and immediacy and involvement due to contact. Mediated interaction has to take into account the conveyance of these feelings as determinant of the satisfaction of the medium. For this reason eye tracking techniques have been used to provide gaze information in mediated environment. Making inferences on others' attention and intentions is part of social communication which is built on minimal social cues. In this frame eye contact have another role as a non-verbal directive to conversation, conveying information about attention orientation and turn-taking regulation. Conversational regulation studies demonstrated that subjects take more turns when they experience more gaze and that gaze has an impact on perceived quality of communication. Even if gaze is such an important contact and communicational cue in mediated environments, its effectiveness is limited to dyadic interactions. So the next step will be to consider which effects feedbacks of group interactions will have on social presence and communication; the richest group social feedback is a social network representation where different indexes derived from interaction behaviors can be shown visually. Visual representation offers a parallel and synthetic demonstration of the multiple interactions taken into consideration. Our study wants to investigate to what extent the visual representation fits the communicational needs that it is supposed to provide and which factors have an effect on the reading of this representation. For the aims of the study the eye tracking technique is the most suitable. In fact, previous studies have reported different eye movements strategies between experts and novices in search patterns, suggesting that stimulus familiarity has an influence on extracted information; furthermore the task given to a subject has a very large influence on the subject's eye movements so the category of required information determine different search patterns. In this sense eye movement patterns are a measure of the cognitive processes involved. If we consider these influences and provide the observers with some ideas about the meaning of the social network representation we will be able to determine what the scanning behavior

reflects and what kinds of information about interaction he/she searches for. Finally, our research aim is to verify in which way eye movement behavior can be influenced by social awareness, namely if social awareness determines a different visual scanning of the social network representation and consequently if we can infer social awareness from the way people look at this feedback, independently of visual aspects of the configuration.

27. Multisensory Enhancement in an Immersive Virtual Reality Game

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It has been shown that in limited presence states - response times (RT) for trimodel cues are shorter than RT for bimodal cues, which are shorter than RT for unimodal cues. But is this true for a higher degree of presence?

In this study we designed a highly immersive game in a 3D visual-haptic-audio virtual reality environment. Presence is achieved by maximal exploitation of technical abilities of our virtual reality system (www.reachin.se) as well as from the emotional involvement of the participants in the survival game.

Our research question is whether accuracy rate and RT improve for multimodal compared to unimodal stimuli in a highly immersive environment. In a second stage of the study, ERP will be recorded while subjects will be immersed in the game and evaluation of the neural correlates of multisensory perception will be performed, also using source estimations techniques. A possible direction for continuation of this study will be to find maximization of the enhancement using stimulus onset asynchrony (SOA) manipulations.

Our main hypothesis is that the efficiency of response will be improved by multimodal perception and sensory-information integration in a presence state.

This study will contribute to the understanding of the reciprocal relation between multimodal perception and presence states: where multimodal perception is evoked – presence emerges, and gives birth to further integration and fuller exploitation of the available sensory information.

28. Combination of interactions through 2D and 3D views

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The expansion of augmented and virtual reality in various application fields raises the question of multimodal interfaces in three dimensional (3D) enhancement. Our research focuses on multimodal visual input and output by combining a 3D view with a 2D view offered to multiple users. The first view we consider is a 2D view browsed on a collaborative tabletop device. The second view is a 3D stereoscopic view projected on a wall screen used by only one user (possibly already using the tabletop view). We are interested in this setting because it provides two complementary views and allows concurrent 2D and 3D interactions on geometrical objects. The concurrence of interactions is a major problem in this type of combination. To face this problem, we divide the Degrees Of Freedom (DOF) for the manipulation of a virtual object: the users interacting through different views share then these DOFs. Another important issue is the ease of space perception (and mental reconstruction) around users (3D) and the top of the table (2D). For this purpose, we now explore 3D audio and the enhancement of the different data presentations through both views.

Day 2-
Thursday 05/07/07

29. Presence related research in Educational Virtual Environments

Tassos A. Mikropoulos, amikrop@cc.uoi.gr ; The Educational Approaches to Virtual Reality Technologies Laboratory, EARTHLAB, The University of Ioannina, Greece

The goal of the EARTHLAB is the scientific research and development in the field of Information and Communication Technologies in Education. The lab has contributed to numerous R&D European and National projects concerning the exploitation of ICT in education and training.
Among the main aims of the lab are:
- Basic research in the field of Information Technologies in education
- Basic research in the field of Virtual Reality in education
- Applied research and development of educational software
- Contribution to education and training.
Presence research in Educational Virtual Environments (EVEs) is one of the main interests of the EARTHLAB. The axes of this research are:
• The study of how participants' sense of presence affects the expected learning outcomes coming from an EVE.
• The investigation of new objective measurement techniques, giving emphasis on electric brain activity (EEG).
Some EVEs we have developed and include presence as one of their main characteristics are:
• The virtual laser
• The virtual earthquake
• The virtual ancient city of Kassiopi
• The virtual laboratory
• Geometrical solids.

30. Perception of Virtual multiple multisensory-acted objects - Musings around the Enactive Assumption

Annie Luciani, Annie.Luciani@imag.fr; IMAG, France
Sile O'Mondrain, Charlotte Magnusson, Jean-Loup Florens, Maxime Houot, Damien Courousé

We explore here, by a parcours through three complementary experiments on virtual objects, how intimate active relations with multisensory audio-visual and haptics perceptions allow to the cognitive creation of new believable and plausible objects than can be different of the virtual objectively implemented ones. The three experiments on what it is called "the Pebble box", consisting in the exploration and the manipulation of multiple moving multisensory objects, show how an inferred scene is constructed from experience, as assumed in the cognitive Enactive concept, and that by means of three complementary strategies: "the Emergent Exploratory Procedures (EEP), the "Dynamic Manipulation Adaptivity" (DMA), the "Adaptive Experimental Learning" (AEL). It shows also the complimentarily between the ergotic and the semiotic situation on the strategies to infer a believable and plausible scene.

31. Experiencing Architectural Models
Comparing the spatial experience of a room-model in different applications

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The subject research deals with questions concerning realistic light and colour appearance in Virtual Reality (VR), from the viewpoint of architectural research. In most computer graphics today, the goal is to make visualizations that look good and sufficiently natural. At present, light and colour cannot be simulated in a realistic and reliable way in Virtual Reality (VR), as has been shown by several earlier experimental studies.
In the project SCAVE (Simulating Colour Appearance in Virtual Environments), a real room has been translated and

compared to digital counterparts in order to study differences in colour appearance. This poster presents one smaller part of this project which focuses on how observers interact with the models. Comparisons between three desktop-applications were made. The applications included two VR-models; one stereographic and one monographic, and a Lightscape-model. All models were based on the same full-scale room, designed to demonstrate a few typical light and colour phenomena.

This poster gives a preliminary overview on issues influencing the experience of the different settings, such as the use of technical devices, possibilities to explore space, ways to move around, the sense of involvement and presence. The results show differences between the desktop VR-models and the Lightscape-model. The desktop VR was described with adjectives commonly used for real rooms, while Lightscape was described in terms of a model. The Lightscape-model was perceived as more realistic and attractive in itself, compared to the desktop VR-models. However, the desktop VR-models had a more realistic environment to move around in. The differences between the stereographic and the monographic model were found to be very small.

32. Stereoscopic visualization in virtual interactions under presence approach

Antonia Lucinelma Pessoa Albuquerque, nelma@impa.br ; PUC-Rio, Department of Informatics, Rio de Janeiro, Brasil

Research on applications that aim to support social and personal interactions to meet partners, friends and family in distance. The main motivation is to contribute to the improvement of communication among remotely located people. A multidisciplinary research approaching Presence, Stereoscopic Visualization and Human Binocular Vision resulted in the proposal and implementation of a model for short distance stereoscopic visualization, through webcams, in real-time, based on concepts of the natural stereo processing of human eye, psychophysical and physiological features of binocular vision, aiming to enrich the visualization in remote interactions by adding the depth perception to webcam images.

Some new research directions are: to make the model more robust by adding more features of the human vision; applying the model for short distance stereoscopic visualization in virtual 3D environments; analyze the sense of presence when using the stereoscopic webcams images obtained from the model proposed, compared with the 2D conventional webcams images; make experiments to analyze discomfort when comparing stereoscopic video using the model proposed with stereoscopic video without it.

Other research interests include Presence in virtual environments, visual computing, virtual and augmented reality, multi-modal interactions and more recently, human aspects, such as psychophysics, cognition and perception. My ideal research goal is to enrich computational systems by adding features based on neurosciences, psychophysics and perception research results.

33. The Emerging other: Social dimensions of virtual reality

Mateo Cantamesse, matteo.cantamesse@gmail.com ; Università Cattolica del Sacro Cuore, Milano, Italy

Project goal is to study social dimensions of presence. The project is based on four studies: the first one is about impact of VEs characteristics on presence and social presence, the second one is about conversational dynamics in VR and the third study is about dialogical co-definition of presence and social presence in a therapeutic setting, and last one is a methodological study, aimed at translating and validating ITQ questionnaire in Italian.

Methods used are questionnaires, conversation analysis and sequential analysis. Some implications of this study are a deeper understanding of presence based on qualitative methods, identification of social presence dynamics and modulation during VR-based therapy.

34. Using Mobile Group Dynamics to Improve Collaboration in Large-scale Virtual Environments

Trevor Dodds, trev@comp.leeds.ac.uk ; University of Leeds, UK

We have developed techniques that help groups of people work together while they travel around large-scale virtual environments. We call these techniques Mobile Group Dynamics (MGDs). They allow users to form hierarchical groups, to rapidly move to a group member's location and automatically follow them, to move to the mean location of the group, and to communicate with group members (via text and audio) wherever they are in the environment.
We evaluated MGDs using the context of urban planning. That is, participants had to review a 3D representation of a residential estate.
The experiment was carried out in two batches. Participants in the first run were provided with the MGD functionality, whereas in the second run MGDs were disabled so functionality was like current CVEs (i.e. a control condition). The teamwork was analysed by detailed assessments of users' patterns of movement and communication.
From here we plan to expand MGDs to go beyond what's possible in the real world (e.g. Slater et al., 1994; Fraser et al., 2000; Pekkola, 2002). Extra functionality will be added to aid distributed collaboration. A prototype system is currently being developed to investigate the use of multiple views, teleporting and increasing the awareness of communication within groups.

35. A novel mobile videoconferencing system for enhancing presence

Savvas Argyropoulos, savvas@iti.gr ; Informatics and Telematics Institute, Centre for Research and Technology Hellas, Greece

Videoconferencing in its most basic form is the transmission of synchronized image (video) and speech (audio) back and forth between two or more physically separate locations. It allows people at different locations to communicate with the feeling as if the participants were in the same physical conversation. However, technological constraints have deterred the proliferation of mobile videoconferencing applications and prevented ubiquitous tele-presence. In this work, a brief review of the existing videoconferencing solutions are presented and the main advantages and disadvantages are discussed. Furthermore, a new videoconferencing solution is proposed based on Distributed Video Coding (DVC) principles, which enable low-cost, efficient, and resilient video transmission over wireless channels.

36. Enhancing presence in VR environments through haptic interaction

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Human perception combines various sensory information—visual, aural, and haptic, for instance—to interpret the environment. Virtual reality applications aim to immerse users in a virtual environment by providing artificial input to interaction sensors such as eyes, ears, and hands. Visual and aural inputs are the most important factors in human–computer interaction (HCI); however, VR applications won't be completely realistic unless they also provide users with the sense of touch. Accordingly, haptics augment the standard audiovisual HCI by giving users an alternative way to interact with a virtual environment.
In the presented approach a novel layered and fast framework for real-time collision detection and haptic interaction in virtual environments based on superquadric virtual object modeling is analyzed. An efficient algorithm is initially proposed for decomposing the complex objects into sub-objects suitable for superquadric modeling, based on visual salience and curvature constraints. The distance between the superquadrics and the mesh is then projected onto the superquadric surface, thus generating a distance map (SQ-Map). Approximate collision detection is then performed by computing the analytical equations and distance maps instead of triangle per triangle intersection tests. Collision response is then calculated directly from the superquadric models and realistic smooth force feedback is obtained using analytical formulae and local smoothing on the distance map.

37. Mixed Reality Interactive Narrative in the eXperience Induction Machine – XIM

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Supported by PRESENCCIA

The objective of a virtual and mixed reality system is to induce specific user experiences. The narrative that these technologies may support usually includes the explicit and/or implicit behavior of the user ranging from their overt actions to their physiological state. Ideally, the content must change the cognitive and emotional state of the user in synchrony with the development of the story. Hence, the success of these technologies will depend on methods and procedures that optimize the identification and engagement of the user with the narrative. These methods and procedures will be fundamentally different from other forms of narrative such as cinema or novel based story telling, because in case of VR and MR systems the story evolves in real-time in a closed feedback loop with the user. Moreover, the user must learn to interact with the narrative system as a natural action, which requires ecologically valid interfaces. In addition, the user must be able to engage and explore every possible articulation of the narration in order to enhance the experience.

The infrastructure in which we express our experiments with interactive narrative, or the eXperience Induction Machine (XIM), is a human accessible physical installation based on a earlier lager-scale exhibit called "Ada: Intelligent Space". XIM -as Ada- comprises of a pressure-sensitive and light emitting floor, overhead cameras, pan-tilt cameras, moving lights, microphones, projection systems and ambient and directional sound output. As opposed to ADA, XIM allows its users to access a Persistent Virtual Community (PVC) where virtual humans and synthetic characters reside. Hence, XIM is a Mixed Reality environment as opposed to an interactive self-contained installation as expressed in Ada. Given this rich repertoire of possible content our objective is to develop an autonomous interactive narrative system that is able to provide an automatic demonstration, or auto-demo, by XIM of all its components, functions and possible applications to novice users. The auto-demo should be informative and have a high emotional with a very short exposure of time.

The narrative structure of the XIM auto-demo is based on the traditional Aristotelian arch model: exposition, rising to climax and denouement that are translated into five stages of the auto-demo: Entrance, Inside Story, Outside Story, Experience and Finale. The Entrance is a welcome ceremony that places the user inside the space. The Inside and the Outside Story explain each component and its function, first XIM (inside) and afterwards the PVC (outside), by means of an avatar -who is the anthropomorphic representation of the ambient intelligence of the space. As the auto-demo proceeds, the content and (inter)action become more complex and spectacular, i.e. the auto-demo arrives to the climax: the experience, where the user interacts directly with the PVC and its inhabitants. Finally, the avatar reappears and bids people farewell until next time.

We will report on the concepts and implementation of the XIM interactive narrative system and present our first analysis of the impact on novice users in both implicit and explicit terms. In addition we describe the further generalization of the XIM auto-demo in terms of taxonomy for concepts and strategies for displaying narrative content, which can provide fully virtual worlds and mixed reality environments with an enhanced immersive narrative experience.

38. Presence enhances relaxation: a preliminary controlled study

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Technologies such as Virtual Reality (VR) that induce presence in a virtual, but still external, perceived world, have great power to evoke emotional experiences that can lead to psychotherapeutically valuable changes in the individual. This reflects the power of presence – seen as the feeling of being located in a perceived, external world – in developing and affecting psychological wellbeing (1).
In this sense the feeling of presence allows VR to play an important role in clinical psychology, that is expected to

increase in the next years (2,3).

Until today Virtual reality Environments (VEs) have been incorporated into a variety of clinical and everyday settings to improve mental health and to enhance well-being. Nonetheless many areas in the health field can be still explored using this innovative technology. One example is represented from stress management area, one of the leading mental health problems of western societies linked to several pathologies (4).

Following this trend our proposal is to investigate the correlations between the feeling of presence induced by different media and the relaxation process. More in detail, the specific goal of this study is to compare the effectiveness of different media- characterized from different level of presence - coupled with an adequate relaxing protocol in producing emotional modifications.

In controlled studies we compared three different media: Immersive VR (experienced with head-mounted display and head-tracking), DVD (video with relaxing music) and Audio speaker, using the same therapeutic narrative and protocol. A control group without treatment was also included in the study.

The sample included 64 university students, randomly divided in the four experimental conditions.

Qualitative and quantitative measures have been used:

- The Positive and Negative Affect Schedule (PANAS) to measure the positive and negative affects (4);
- The State Trait Anxiety Inventory (STAI) to measure the level of anxiety (5);
- The ITC-SOPI Presence Questionnaire to evaluate the level of presence (6);
- Different physiological parameters (RES, HR, SC)

Non parametric test and correlation were used to analyse self-reports and physiological parameters. Within groups analysis - in both VR and DVD conditions - showed a significant increasing of positive emotional state (relaxation), a reduction of negative emotional state (anxiety) and significative physiological changes in respiration rate, heart rate and skin conductance parameters. No significant differences J19were found from the between groups analysis. These results appear coherent with data referred to correlations between sense of presence and changes in anxiety and emotional state. Considering both the whole group of participants and the four conditions separately, results indicate that the sense of presence experienced from the subjects during the experiment could play a critical role in enhancing the effectiveness of the treatment. In particular ecological presence and engagement, from ITCSOPI Inventory, reveal good correlations with anxiety reduction and relaxation increasing.

Further reflections about sense of presence in relaxing virtual environments will be discussed.

39. Presence in Interactive Experiences

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Current applications areas of both Virtual Reality and gaming such as edutainment, cultural heritage, and serious gaming, rely heavily on the emerging area of Interactive Experiences. Prior and on-going work within our group focuses on supporting the creation of Interactive Experiences in immersive VR settings, with a particular focus on the creation of interactive, dynamic environments. Here, we present a number of developing research directions to be explored in regards to the relationship of Interactive Experience to the user's presence. A particular focus is given to how presence might be affected by the nature of the environment of the Interactive Experience. A number of hypotheses as to the effect of Interactive Experiences on user presence and environments to test them are proposed.

40. What do humans remember from exploring objects in an immersive environment?

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Humans tend to learn objects by seeking out and representing relevant information for future reference. Here, we demonstrate the implementation of virtual reality technology in behavioral experiments. In our research, we used a marker tracking system (three VICON cameras) and a headmounted display (Z800 3DVISOR eMagin) to create an immersive learning environment. During learning, participants manipulated an unconstrained device that was spatially tracked. The controller's coordinates, relative to the observer's viewpoint, determined the position and orientation of computer rendered 3D objects that were presented through the head-mounted display. In other words, the tracked device acted as a physical substitute for the virtual object on display.

To validate the benefits of active exploration, we compared differences in old/new recognition performance when participants either actively manipulated the objects or if they passively viewed video playback of learned and novel objects. Our recordings during object exploration were used to control the video playback of objects during testing. That is, tested objects were presented in the same way as was previously explored by the observer, in reverse (i.e.,

the object moved in reverse to how it was previously explored) or with the exploration pattern of someone else. Test results showed that participants performed equally well when they actively explored objects during testing and when they viewed video playback of their own object explorations (mean accuracy: 68.3%, 69.8% respectively). In contrast, recognition performance from video playbacks that were based on either their exploration patterns in reverse or someone else's exploration was significantly worse (mean accuracy: 62.5%, 61.5% respectively). These results suggest that active exploration does not necessarily improve object recognition over passive observation, as long as an individual's learning experience can be effectively reconstructed. In conclusion, this study provides an example of how virtual technology can be effectively applied in studying natural human behavior. Data collected from human object exploration i.e., tracked coordinates, could be carefully manipulated for subsequent experimentation as well as provide much insight into the type of information that facilitates learning e.g., as aspects of object that are most frequently viewed.

41. The Role of Artefacts in Presence Mediation

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Approaches to support computer mediated communication (CMC) have predominantly relied on the face-to-face communication paradigm. However, interaction and coordination can also be supported by different technological artifacts. In fact, most researches [1, 2, 3] related to ethnomethodology have shown that physical and digital artifacts play an important role in supporting effective communication. Because of its physical and material properties (content, appearance and disposition) an artifact can serve as a carrier of information related to mediating presence and coordinative work practices [4, 5]. Some of our previous research has shown that artifacts can be seen as traces, cues and modifications of different activities of distant or co-located interactants [6, 7]. This not only provides feedback to interactants but also triggers new actions on the artifacts. These activities can be (partly) recorded in artifacts and this record can be used to observe presence and to coordinate work.
In this poster, I report two cases on artifact-mediated presence. 1) The Panorama system [6, 7] that mediates social presence in a playful and creative way within a work environment, and 2) A work-in-progress system that will supposedly mediate different activities within a meeting room to the geographically distant attendees. Both the cases conceptualize 'presence' as reflections that are supported by cues and traces of users' actions in the specific environment. Since these cues and traces are not explicitly conveyed, but through the technological artefacts, they allow users to construct social and emotional connections with other users within the department (in the first case) and at the same time allow co-workers to co-ordinate their meeting practices in remote meeting scenarios (in the second case).

42. Being present – Being Mindful

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This paper consists of a comparative analysis between the constructs of sense of presence and mindfulness. Although a potential relationship between these two concepts has been previously highlighted in the presence literature, no study has focused on investigating the theoretical perspectives or offered empirical evidences to support this relationship.

43. Supramodal organization in the visual cortical pathways as assessed by functional magnetic resonance in humans

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We report here the results of different studies conducted using functional magnetic resonance imaging (fMRI) to determine the functional organization of the cerebral cortex in response to visual and tactile input. Specifically, we investigated whether the two main components of the cortical visual systems, i.e., the ventral what pathway and the dorsal where pathways, are devoted merely to the processing of visual information or rather they are organized in a supramodal fashion, that is, they are able to process information independently from the sensory modality through which such an information reaches the brain. Sighted and congenitally blind individuals underwent fMRI scan examination while performing distinct experimental tasks involving visual and/or tactile stimuli. In a first study, we showed that visual and tactile recognition of different object categories both activate the ventral extra-striate visual

cortex of the temporal lobe, that patterns of neural response are category-related, and that visually-evoked patterns of neural response are correlated with tactilely-evoked patterns, indicating a supramodal organization in this cortical region. We then showed that also tactile and optic flow perception both activate a similar network of regions involved in motion detection, including the human MT+ complex, and the intraparietal and ventrolateral occipital cortex. Finally, results from a study on visual and tactile localization of spatial patterns suggest that these tasks also share common areas in the dorsal extrastriate visual pathway. Altogether, the results of these distinct studies consistently indicate the existence of supramodally-organized extrastriate cortical regions that support a sensory modality-independent interaction with the surrounding environment.

44. Neural correlates of mental representation of the surrounding space in sighted and congenitally blind individuals as measured by fMRI

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Spatial perception and spatial imagery are fundamental abilities to perceive and to understand the surrounding environment, both in sighted and in blind individuals. These two spatial skills share common cortical regions within the parietal lobes. The extrastriate cortex of the dorsal pathway for spatial localization can process stimuli independently from the sensory modality that conveys the information to the brain and thus appears to be organized in a supramodal fashion. In this study, we aim at verifying that these cortical areas would be involved in the mental representation of spatial information acquired through non-visual sensory modalities too, both in sighted and in congenitally blind subjects.

We used fMRI (GE Signa 1.5 Tesla scanner) to examine neural activity in 10 sighted and 10 congenitally blind right-handed healthy volunteers while they performed a modified version of the mental clock task in three distinct conditions: auditory imagery, tactile discrimination and visual discrimination (sighted subjects only). Performance accuracy was greater than 70% in all subjects. During the auditory imagery condition, both the sighted and congenitally blind individuals showed significant activations in posterior parietal areas, including the intraparietal sulcus and the inferior parietal lobule. These same areas showed significant activations also during the tactile and visual angle discrimination conditions. As expected, auditory, visual and tactile primary sensory regions also were activated during the respective conditions. Ventral occipital brain areas additionally were recruited in blind as compared to sighted subjects during both the tactile and auditory tasks.

These results indicate that both spatial discrimination and spatial imagery representation occur in the posterior parietal extrastriate cortex also when spatial stimuli are not visual in nature. Furthermore, the observation that these cortical regions also are activated in individuals with congenital blindness indicates that visual experience is not a prerequisite for the development of the neural functional architecture for spatial processing and spatial imagery. This may also explain how people who have had no visual experience are able to form appropriate mental spatial representations about their surroundings, and thus interact effectively with the environment.

45. From the Presence to the Flow by means of technology

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In the present PhD research it comes validated a questionnaire (Italian language) in order to measure and to verify the Optimal Experience in terms of Presence and Flow, in contexts of daily life and virtual environments.

46. Subjective significance brain classifier

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Background: Subjective significance classifier is not available yet. Most scientific studies until now utilized universal emotional significance, without any assessment of the subjective emotional significance. Most studies until now have been fMRI studies, and not ERP studies.
Purpose: build a subjective significance brain classifier algorithm, for automatic assessment of subjective significance.

Methods: The data used for this classifier is 16 subjects ERP patterns. The subjects were hearing names, whose subjective significance was assessed by a questionnaire only after the experiment.
Results: In this work, we are developing an algorithm which classifies the subjective significance of stimuli to the subject based on brain activity patterns (ERPs).
Significance: The results of this study may serve a subjective significance evaluation tool.

47. Presence in stressful environments

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The needs for training in dangerous situations in all stages of an educational system through secure environments, so that the maximum experience's transfer in real situations to be gained, leads to the implementation of suitable educational virtual environments. Participants' sense of presence in such synthetic environments is a factor of major importance. Our work concerns the estimation of the factors that contribute to the sense of presence in an educational virtual environment in earthquake situations. We study the factors of mental transfer, the contribution of external sensory stimuli and the virtual environment's realism. The results form a pilot study show that the sense of presence depends on the attribution of virtual environment's content and on it's enrichment with external sensory stimuli. Subsequently, we will study whether the interaction in such educational virtual environments increase the participant's sense of presence. We will implement three different versions of a virtual school where the user can navigate, be taught about seismic precautions by a virtual teacher and learn how to react during a real earthquake.
The first version of the environment will be a 3D studio animation film with no interaction. The second version will be the same virtual environment in which users will be asked to follow the same route they saw in the animation film. The third version will be the same as the second one with the user following free navigation. A virtual earthquake will take place in all the versions.
In order to measure the sense of presence we will use the questionnaire developed by Lombart.

48. VR-enhanced treatment of emotional eating in obese subjects: a controlled randomized clinical trial

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Emotional eating is a dysfunctional eating behavior that affects many obese subjects. It consists in eating food in response to negative as well as positive emotions. Clinical observations as well as laboratory studies have showed that over-weighted and obese subjects tend to eat more food in response to emotions than normal-weighted subjects and tend to eat in response to emotions even when normal-weighted subjects don't.
In order to help obese subjects to cope and manage the emotions in response to which emotional eating occurs, we developed a new VR-enhanced therapeutic protocol that consists in both pc-based and mobile sessions. It incorporates different clinical components, from progressive muscular relaxation and deep breathing exercises to cognitive-behavioral auto-monitoring technique, through some elements of the emotion-focused therapy like developing emotion awareness and inducing good feelings. It is composed by six pc-based and therapist-based sessions, three for each of the two weeks the treatment lasts. During three of the six pc-based and therapist-based sessions, subjects are immersed in a virtual environment in which they experience and learn relaxation by applying different relaxation techniques, listening to therapeutic narratives, which serve two purposes: generating a deeper sense of presence in order to increase emotions and providing the relaxation instructions.   The goal of this study was to evaluate the efficacy of this procedure in a sample of obese female in-patients. A total of 38 obese female in-patients (mean age 42; mean BMI 40) reporting events of emotional eating in the previous month were consecutively recruited and randomly assigned to three different groups: VR treatment; a similar procedure not supported by VR and a control condition. The questionnaires used were the State version of State-Trait Anxiety Inventory (STAI-Y), the Visual Analogue Scale (VAS), the Positive and Negative Affect Scale (PANAS), the ITC-Sense of Presence Inventory (ITCP-SOPI), all administered before and after each VR and therapist-based sessions, the Weight Efficacy Life-Style Questionnaire (WELSQ) and the Beck Depression Inventory (BDI), administered only at the beginning and at the end of the whole treatment. Physiological variables (heart rate, SCR, respiration rate) were also assessed for three minutes pre and after each session.
Statistical analysis executed on data from 32 in-patients (6 didn't conclude the treatment) show that VR group (n. 14) obtained higher and more numerous significant improvements through the sessions both in psychometrical and

physiological variables in comparison with the other treatment group (n. 10). Besides, VR group significantly improved in psychometrical and physiological variables between the beginning and the end of the whole treatment, while both the other treatment group and control group didn't. Analysis show significant correlations between changes in anxiety and emotional state and several factors of presence. This correlation is independent by the type of measurement (objective or subjective) used to evaluate emotional change.

In conclusion, considering the limit of the small sample size, this study shows that the VR treatment is effective in reducing negative emotions, in improving positive ones and in increasing the weight-related self-efficacy.

49. Social Interaction in VR

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Supported by ImmerSence

To make realistic social interaction in virtual reality possible, the underlying models of these communications have to be understood. So in recording scenarios like handshaking and dancing knowledge on general rules of interaction can be identified. The implementation on hardware will not replay the acquired data but represent an interactive haptic model of a virtual human. Another important aspect is the basic examination of language rules in social interaction studied with more abstract scenarios.

50. Multimodal Demonstrator based on MasterFinger-1 Haptic Interface

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A 'thumb wrestling' scenario that evaluates haptic and visual interactions is described. Each player has a MF-1 haptic device and a computer display. The MF-1 transmits interaction forces and the computer runs a graphical simulation for the users' movements. A player attempts to capture his opponent's thumb while avoiding to be wrestled out. During the match, the wrist and the rest of fingers are kept still. All haptic information is managed by a computer server that receives processes and sends the information back via Ethernet. This scenario allows the performance of this haptic interface to be evaluated in terms of haptic interaction between two people. It is a person to person demonstrator developed by UPM into the IMMERSENCE project which is funded by EC. MF-1 is the first version of novel haptic devices. New versions of MasterFinger for 2 and 3 fingers are being developed.

51. Presence Aspects for 3D Audio in mobile Outdoor Augmented Reality

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Supported by IPCITY

My Masters thesis focuses on developing a spatial acoustic system for use in mobile outdoor Augmented Reality (AR) environments. To assist the user in visualizing the scene they experience 3D binaural sounds. In contrast to purely virtual environments, users of AR environments are also in the real world and thus may continue to experience sounds from the natural environment. AR Audio builds upon this issue by making virtual sounds appear like an extension of the natural sounds. Although a large amount of work concerning audio in AR/VR already exists, the work presented here mainly deals computer graphics related issues. Using 3D binaural sounds should provide the user with an additional source of information thus improving their sense of orientation and immersion.

52. Interaction metaphors and evaluation method for collaborative work in virtual immersion

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Virtual reality technologies have often been used in the training areas to simulate physical phenomena or to represent virtual objects in the objective to propose an interaction as in a real environment. One first difficulty is to reproduce the environment and the objects such as they look like (physical properties). A second difficulty is to simulate interaction task in their environments naturally from the point of view of human perception. For these reasons, it is important to take into account peripherals of virtual reality and their influence in the interaction process. In fact, the technology and the method chosen to implement it have a strong influence on the virtual immersion and the sense of presence. So, presence or virtual immersion for interaction and particularly in collaborative work is very important elements and a very promising research issues. However many research tasks have been aimed at developing specific solutions concerning collaborative works in the same place of virtual immersion or in remote places by a synchronous or asynchronous way. They rarely treat the methods and tools of collaborative work between two distant sites of virtual reality with human scale consideration. Our research work is related to the methods and tools of virtual reality for collaborative work in virtual immersion. We focus our work on the interaction and representation metaphors allowing an optimization of the techniques and methods of collaborative work in virtual immersion. In particularly, human representation of the remote person (human scale, partial body representation, spatial position of the body…) is performed for the collaborative task. Methods of interaction (human-object interaction, human-human interaction, interaction protocol) are in development. These metaphors would be validated by methods of qualification related to criteria linked to the degree of social presence. The methods used would be related to cognitive sciences such as questionnaires or physiological behaviour like the movement of the body, the muscular activities, the cardiac activities, sudation and so on in the experiment of a collaborative task in virtual immersion. The proposed methodology would be a help to the development of technologies (design) and metaphors (methods) for collaborative work in virtual immersion.

53. Agent Expressivity in Virtual Environments Based on Appraisal Theory Predictions

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Our current work investigates issues of expressivity and personality traits for virtual agents. We use emotion modelling and personality theories from psychology to generate synthetic behaviours that make sense in situated scenarios. Detailed predictions put forward by these theories concerning the appraisal of events; the role of personality traits and the expressive result of this appraisal are used to drive the synthesis process. Both MPEG-4 facial and body expression synthesis as well as open source character animation tools are used. The environments for the scenarios are defined and modelled with the use of state of the art game engine technology and thus allow for dynamic interactions with human users. We focus on generating simple agent behaviours, comprised of facial expressions and gestures in a well defined context of non-verbal interaction.

54. Temporal calibration between the visual, auditory and tactile senses: A psychophysical approach

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Human observers acquire information about physical properties of the environment through different sensory modalities. For natural events, these sensory signals show a specific temporal, spatial and contextual configuration that aids the integration into a coherent multisensory percept. For multimodal virtual environments, however, signals have to be created and displayed separately for different modalities, which may result in a miscalibration of these signals. This, in turn, can greatly reduce the observer's sense of immersion and presence.

Using psychophysical methods, we investigate fundamental questions regarding how the temporal alignment of signals from the visual, auditory and tactile modalities is achieved. A first project examines the perception of subjective simultaneity of signals. Simultaneity detection poses a non-trivial matching problem to the human brain: physical and neural transmission times differ greatly between the senses. As there is only partial compensation for these differential delays, subjective simultaneity may result from presenting stimuli with a physical delay. Here, we are interested in whether this phenomenon reflects an amodal timing mechanism that works across all modalities in a uniform fashion. Further, we look at the sensitivity for asynchrony detection for different modality pairs as well as at interindividual differences.

In a second project, we examine the ability of the human cognitive system to adapt to asynchronous information in different modalities. Adaptation may be used to reduce the disruptive effects of temporal miscalibration between signals in different modalities. We are interested in the strength of adaptation as well as the mechanism underlying this effect.

Future projects aim at the investigation of
- the precise relationship between the perception of synchrony and multimodal integration,
- the influence of prior knowledge about a common origin of signals on the perception of synchrony
- the influence of timing on the perception of cause and effect
- the neural basis of the detection of synchrony

In conclusion, our research seeks to understand the mechanisms underlying temporal calibration between different sensory modalities with the goal to identify factors that foster multimodal integration and, in turn, the sense of presence.

55. Companions with Kansei, the technology of emotions

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The COMPANIONS project is a EU funded Framework Programme 6 project.

This project is an ECA (Embodied Conversational Agent) which differs from the ECA state of the art by having large-scale speech and language capacity.

The project's vision is that of a personalised conversational, multimodal interface, one that knows its owner and implemented on a range of platforms, indoor and nomadic, and based on integrated high-quality research in multimodal human-computer interfaces, intelligent agents, and human language technology.

Our empirical work will take into account the perceived quality and the users' needs by introducing the Kansei method. "Kansei" is a Japanese term which means psychological feeling. Kansei engineering refers to the translation of consumers' psychological feelings towards a product into perceptual design elements.

We will use these results for the next creature prototypes to build a real empathy with the companion in order to guide the acceptance of the innovation through relationship and this new interaction.

With the holistic vision thanks to the crisscrossing of borrowed methods from other design disciplines, the Centre of Interaction Design is preparing the big shift from interaction to relationship.

56. Modulation of cortical auditory responses by the behavioural relevance of the stimulus

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Perception is adaptive, both to the environment and to the goals of the subject. Most importantly, it is often restricted by information gathered through previous experience. What happens when there is a difference between expectations and the sensory input? The need to make better predictions can therefore guide the formation of appropriate representations. It has been also suggested that primary sensory areas can be influenced or activated by other sensory modalities, attention, expectation, or mental imagery. We have already evidenced that repetitive stimulation often induces adaptation to the stimulus. Therefore, sensory responses, and consequently how stimuli is experienced, are deeply influenced by the previous history of stimulation. Our interest now, is on exploring how top-down processing,

i.e. expectation, attention and behavioral relevance of stimuli, influences responses of single neurons in primary sensory auditory cortices. Our experimental technique is chronic multi-electrode recordings from A1 and A2 cortical areas in awake behaving rodents. In our recordings, trained rodents perform different behaviours according to auditory cues, which allow us to study the behavioural and neurophysiological basis for expectation. Our long-term goal is to apply these neuropshysiological and behavioural insights obtained in animal experiments toward an understanding of the human correlates of auditory perceptual phenomena and its cellular mechanisms.

57. Tactile perception and emotional responses: a behavioural study

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Tactile perception in humans, including the haptic sense, defined as a specific "active touch" modality, has been investigated under several psychophysical and functional aspects. However, behavioural and emotional responses evoked by touch and haptic sense are still ill-defined. The aim of our study is to investigate the emotional responses prompted by different haptic components (i.e. softness, compliance, curvature, texture, temperature, etc.), and to determine how these affective reactions modify while changing haptic parameters. Healthy volunteers enrolled in the study underwent a full personological evaluation (temperamental inventory (TCI) and an empathy scale (IRI)) and were tested with various haptic actuators (MagnetoRheological-based devices, Contact Area Spread Rate device, Peltier's cell and plastic surfaces) to differentially modulate the different tactile parameters. Initially, we assessed psychometric curves of these haptic actuators using standardized procedures (such as Just Noticeable Difference (JND) and Two Alternative Forced Choice (2AFC) for perception tasks). Then we employed the same devices to determine the emotional responses prompted by different haptic components. Volunteers were asked to tactilely explore the devices across different trials (thus, while changing haptic parameters), and to provide with an emotional evaluation of their perceptual experience using a Self-Assessment Manikin (SAM) scale.

The characterization of these haptic devices both from the psychometric and the emotional point of view may help in understanding the emotional component of tactile/haptic perception, and further support in the realization of haptic devices able to better reproduce the tactile experience. The concept of an enhanced tactile presence may overcome the simulation issue, and develop also in social sciences.

List of Keynote speakers

(alphabetical order)

Prof **David Benyon**, d.benyon@napier.ac.uk ;
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Prof **Mel Slater**, melslater@gmail.com ;
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Dr **Anna Spagnolli**, anna.spagnolli@unipd.it ;
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Dr **Paul F.M.J. Verschure**, paul.verschure@iua.upf.edu ;
University Pompeu Fabra (Presenccia IP-EU Project)

List of demo & working group moderators

(chronological order)

PASION Session-Methods in Presence and Social Presence Studies. Joining Ethnography and Social Network Analysis.
Prof **Luciano Gamberini,** luciano.gamberini@unipd.it ; Human Technology Laboratories
Department of General Psychology, University of Padova (Pasion IP-EU Project)
Dr **Anna Spagnolli,** anna.spagnolli@unipd.it ; Human Technology Laboratories
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Mrs **Fabiola Scarpetta,** fabiola.scarpetta@gmail.com ; Human Technology Laboratories
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Ultramundum Foundation session
Mr **Fulvio Dominici,** firstfounder@ultramundum.org ; Ultramundum Foundation
Mr **Musso Grandi,** firstfounder@ultramundum.org ; Ultramundum Foundation
[http://www.ultramundum.org/]

Presence and disabled people
Enhancing presence in VR environments for the disabled through haptic interaction
Dr **Evangelos Bekiaris**, abek@certh.gr, Hellenic Institute of Transport, Centre for Research and Technology Hellas
Dr **Dimitrios Tzovaras**, Dimitrios.Tzovaras@iti.gr ; Informatics and Telematics Institute Centre for Research and Technology Hellas

Presence and artificial companions
Prof **David Benyon**, d.benyon@napier.ac.uk ; Napier University
[http://www.napier.ac.uk/]

Real-time psysiology and media session
Dr **Doron Friedman**, d.friedman@cs.ucl.ac.uk Department of Computer Science, University College London
[http://www.cs.ucl.ac.uk/]

IPCity Session
Dr **_Wolfgang Broll_**, wolfgang.broll@fit.fraunhofer.de ; Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
Dr **_Rod McCall_**, rod.mccall@fit.fraunhofer.de ; Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
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Mr **_Markus Sareika_**, sareika@icg.tugraz.at ; Technische Unversität Graz,Austria
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EEG based brain-computer interface for cursor control and spelling
Dr **_Cristoph Gurger_**, guger@gtec.at, Guger Technologies OEG
[http://www.gtec.at/]

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Notes