

Human-Human-Machine Interactions in Augmented Physical Environments

Lausanne, EPFL, June 2nd – 5th 2009

"RedInk" is a doctoral programme that gathers PhD students from education, psychology and computer science around the theme: "Rethinking education in the knowledge society". This fourth seminar addresses this ambitious theme from a computer science perspective. Why is the evolution of technology relevant for envisioning tomorrow's education? New collaborative environments embody a view of learning that is different from the rather boring world of e-learning. They are not designed for distance education but for augmenting face-to-face interactions. When participants sit around a table, the computer has to "disappear" in the background, leaving the front stage to rich social interactions, to eye contact, to gestures, to the manipulation of tangible objects, to the integrated use of paper, etc. This workshop is about augmenting the physical environment in which students learn. The pedagogical challenge is the integration of computer-augmented activities in the multiple flows of classroom activities.

The goal of this workshop is two-fold. For researchers in computer science, it will provide an overview of past and current research on augmented collaborative workplaces. For researchers who aim to measure the educational impact of technologies, this workshop should push them to look beyond established e-learning tools and to consider this novel perspective on learner-learner-computer interactions. The workshop includes talks by invited speakers and by PhD students as well as demos. On Thursday morning, we will join the research day of the EPFL School of Computer and Communication sciences.

Registration: florence.colomb@epfl.ch

This workshop is funded by the Swiss National Science Foundation

Programme

Tuesday June 2nd

Room CE 1 530

- 15:00 Welcome and overview
Prof. Pierre Dillenbourg
- 15:30 Hands On Demos (see list in Appendix)
- 17:30 End

Wednesday June 3rd

Room BC 410

- 09:00 ***"Interpersonal computers for higher education"***
Dr. Frédéric Kaplan (EPFL)
- 10:30 Pause
- 11:00 Tobias Jenert: 15 min talk + 30 min discussion
11:45 Luca Mazzola: 15 min talk + 30 min discussion
- 12:30 Lunch
- 14:00 ***"Integrating Learning Processes in Distributed Environments
with Ubiquitous Computing Technologies"***
Prof. Ulrich Hoppe (University of Duisburg-Essen, Germany)
- 15:30 Pause
- 16:00 Anja Gebhart: 15 min talk + 30 min discussion
16:45 Andres Schmeil: 15 min talk + 30 min discussion
17:30 Stefano Carrino: 15min talk + 30 min discussion
- 18:15 End of the day
- 18:30 Social Event

Thursday June 4th

In partnership with the research day of the school in computer science.

09:00	Opening and Introductory presentations (ROOM CO1)
09:00	"Programmable Reality" (ROOM CO1) Dr. Ivan Poupyrev, Sony CSL Interaction Lab, Tokyo, Japan
10:00	Coffee break
10:30	"The Myth of Touch" (ROOM CO1) Dr. Chia Shen, Harvard University, USA
11:15	"Labours of love in the digital home of the future" Prof. Richard Harper, Microsoft Research, Cambridge, UK
12:15	Lunch with I&C participants (BC Atrium)
13:00	Demos & posters (BC Atrium)

I&C Research Day

Room BC 02

15:00	Questions & Answers with Chia Shen
16:00	Pause
16:30	"Designing Instrumental Interaction Interfaces" Michel Beaudoin-Lafon, Université Paris-Sud / CNRS
18:00	Guillaume Zufferey: 15 min talk + 30 min discussion
18:30	End of the day
19:30	Barbecue on the lake side

Friday June 5th

Room BC 02

09:00	"Interacting with Paper on the DigitalDesk- ideas from the early 90's that may still be relevant today." Pierre Wellner, SpiderPhone
10:30	Coffee pause
11:00	Son Do-Lenh: 15 min talk + 30 min discussion
11:45	Hamed Alavi: 15 min talk + 30 min discussion
12:30	Evaluation of the workshop (by Luca Botturi)
13:00	End of the workshop

ABSTRACTS & BIOS

"Interpersonal computers for higher education"

Dr. Frédéric Kaplan, CRAFT, EPFL

Abstract: I will explore the design and use of interpersonal computers for higher education through the discussion of three specific examples developed and tested in our lab – a table, a lamp and a robotic display. Research in collaborative learning invites us to consider two key features for the design of computers on which several persons can interact in the same place, at the same time. Such systems should permit fluid interactions among group members and not act as an obstacle to natural collaboration but also offer means to influence ongoing interactions: augmenting the frequency of conflicts, fostering elaborated explanations, supporting mutual understanding, etc. How can the same tool be sufficiently transparent to foster natural interaction dynamics and sufficiently present to shape group processes? These two contradictory goals act as guidelines for designing efficient interpersonal computers.

Bio: Frederic Kaplan graduated as an engineer of the Ecole Nationale Supérieure des Telecommunications in Paris and received a PhD degree in Artificial Intelligence from the University Paris VI. He worked ten years as a researcher at Sony Computer Science Laboratory in Paris and supervises interactive furniture research at CRAFT (EPFL). His most recent research focuses on the design of interpersonal computers and robotic objects.

"Integrating Learning Processes in Distributed Environments with Ubiquitous Computing Technologies"

Prof. H. Ulrich Hoppe

Dept of Computer Science and Applied Cognitive Science

University of Duisburg-Essen, Germany

Whereas individualisation and segmentation have dominated earlier research on educational media, we now see integration as a new theme and challenge. We will distinguish and elaborate on two perspectives: (1) the integration of media to support a smooth and seamless information flow in both virtual and face-to-face classroom scenarios, and (2) the use of ICT to bridge between different conditions of learning, such as individual, small group or large community activities as well as synchronous and asynchronous settings. The integration of media and of group scales relies essentially on mechanisms for handling "emerging learning objects" in terms of production, exchange, re-use and transformation. To better support "learning flow" it also appears to be relevant to model and monitor expected learning processes.

Bio: Ulrich Hoppe is professor of computer science. From his work on artificial intelligence applied to education, he has kept a strong interest in modelling the socio-cognitive processes involved in learning. He has been a pioneer in computer-supported collaborative learning, launching of the key ideas such as media integration and integrated classrooms. His work on the NIMIS classroom, a first year primary school using roomware, was the first example of the theme of this workshop: understanding how novel interfaces may have an impact on educational activities.

"Programmable Reality"

Dr. Ivan Poupyrev, Sony CSL Interaction Lab, Tokyo, Japan

Abstract. What would happen when we will be able to computationally control physical matter? Until recently, this question was mostly dealt in science fiction novels and movies. However, with recent developments of "smart" materials, such as plastic and printable electronics, tiny *actuators*, and continuing increase in available computing power we have been gaining significant digital control of various aspects of our physical world. As this trend accelerates we will be stepping into new brave world where we no longer programming computers anymore, but programming the reality itself. The emerging vision of programmable reality will be the topic of my talk.

Bio Ivan Poupyrev designs and research interfaces that add physical feel to digital data, such as mechanical devices that can change their shape and interfaces that can communicate information through touch. He has been also working on the novel interfaces for small handheld computing devices, as well as 3D user interfaces for virtual and augmented reality. On a larger scale, he is interested in deeper understanding of the impact that interaction technology and design makes on people and society.

"The Myth of Touch"

Dr. Chia Shen, Harvard University, USA

Abstract. Are multi-touch tabletop interfaces as intuitive as they seem in YouTube demonstrations? Do we perceive better by touching? How do users really perform on a touch surface? In this talk, I will illustrate that "seeing can be deceiving, and touching can be confusing." In the world of direct touch and tangible computing, there is much more than meets the eye. Uncertainty abounds, and observing the users operating around the tabletop in vivo often yields revelations for the designer and the researcher. Yet there is not a canonical multi-touch user. We have learned again and again that each user brings a different mental model to the table. Our design of human-computer interaction will need to contend with this variety of mindsets.

Bio Chia Shen is a Senior Scientist and Program Manager at the Initiative in Innovative Computing at Harvard University. She was a Senior Research Scientist at MERL (the Mitsubishi Electric Research Labs) in Cambridge, Massachusetts, where she also served as Associate Director of the Research Lab from 2003 to 2006. Dr. Shen is a leader in the field of multi-user, multi-touch tabletop user interface and computing. DiamondSpin, developed at MERL under her direction during 2001–2003, is the first open toolkit made available to the tabletop research community for the construction of experimental multi-user tabletop applications. Prior to moving to the field of Human Computer Interaction, she worked for over ten years in parallel and distributed real-time systems.

"Designing Instrumental Interaction Interfaces"

Prof. Michel Beaudouin-Lafon, Université Paris-Sud

Abstract I will present instrumental interaction, an interaction model that expands and generalizes direct manipulation to a wide range of interfaces, including tangible and mixed-reality interfaces. I will then present three design principles for creating instrumental interfaces: reification, polymorphism and reuse, and explain how they complement each other to help create interfaces that are both simpler and more powerful. I will illustrate these concepts with a range of techniques and interfaces developed at the InSitu lab, and conclude with a more general vision of interaction as a new paradigm for computing.

Bio. Michel Beaudouin-Lafon is Professor of Computer Science at Université Paris-Sud (France) and director of LRI, the laboratory for computer science joint between Université Paris-Sud and CNRS. Michel has worked in human-computer interaction (HCI) for over 20 years and has published over 100 articles. He was elected to the ACM SIGCHI Academy in 2006. His research interests include fundamental aspects of interaction, engineering of interactive systems, computer-supported cooperative work and novel interaction techniques. His current research is conducted in the In Situ group, a joint lab between LRI and INRIA. Michel founded AFIHM, the Francophone association for human-computer interaction, in 1996 and has been a member of the ACM Council and the ACM Publications Board.

"Labours of love in the digital home of the future"

Prof. Richard Harper, Microsoft Research, Cambridge, UK

Abstract. What will homes of the future be? Will they offer all sorts of automation that will let the occupants be lazy and indolent? Will this make for contentment? We think that automation will have a place in the home of the future, but our concern is not with proving the individual with machines that take over their every labour: we think contentment at home will also be delivered through allowing people to invest in labours of love. These can take many forms and can be supported in various new ways - and in this talk I will describe some of those we have been investigating at Microsoft's Socio-Digital System's group, in Cambridge.

Bio, Richard Harper is Principal Researcher at Microsoft Research in Cambridge and co-manages the Socio-Digital Systems group. Richard is concerned with how to understand what it is to design for 'being human' in an age when man-as-machine type metaphors, deriving from Turing and others, tend to dominate thinking in the area. Trained as a sociologist and with a strong passion for ordinary language philosophy, he has published nearly 100 papers and is about to publish his 10th book, *Texture: Human expression in the age of communication overload*, (MIT Press). Amongst his prior books is the IEEE award winning *The Myth of the Paperless Office* (MIT Press, 2002), co-authored with Abi Sellen. His work is not only theoretical or sociological, but also includes the design of real and functioning systems, for work and for home settings, for mobile devices and for social networking sites. Numerous patents have derived from his work. Prior to joining MSR, Richard helped lead various technology innovation and knowledge transfer companies, while in 2000 he was appointed the UK's first Professor of Socio-Digital Systems, at the University of Surrey, England. It was here he also set up the Digital World Research Centre. Prior to this he was a researcher at Xerox PARC's fifth lab, EuroPARC, in Cambridge.

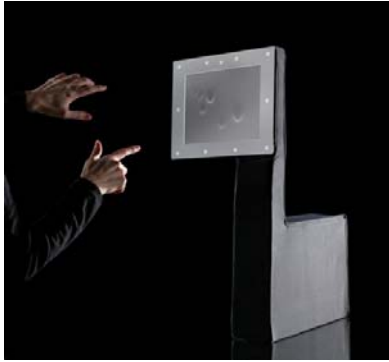
"Interacting with Paper on the DigitalDesk - ideas from the early 90's that may still be relevant today."

Pierre Wellner, Spiderphone

Abstract. The DigitalDesk was designed to augment physical paper documents with electronic properties. At a time when the desktop metaphor was well-established and much HCI research focused on virtual reality, the DigitalDesk explored an alternative approach: to enhance physical paper on the real desktop, rather than virtual paper on the desktop metaphor. Today, real paper is still an important tool, and it is much better integrated with computers than before, but we can still imagine computer-augmented desktop environments that go much further towards making paper documents asfunctional as digital documents.

Bio. Pierre Wellner is currently CTO of Spiderphone.com, a web-enhanced conference call service company. Prior to this he was a researcher at the IDIAP Research Institute in Switzerland working on interaction techniques for browsing of recorded meetings. Pierre was also an HCI researcher for AT&T Bell Labs in New Jersey, and for Xerox PARC in Cambridge UK, where he did his work on DigitalDesk. His PhD is from the University of Cambridge Computer Laboratory.

DEMOS on Tuesday and on Thursday



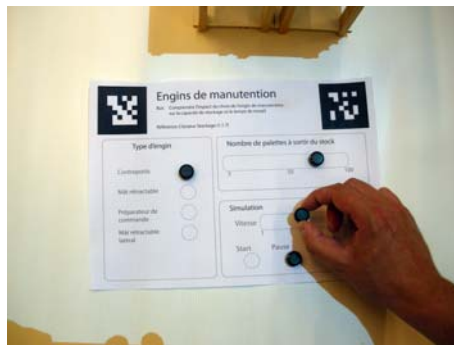
QB1
Frédéric Kaplan



RELECT Table
Khaled Bachour



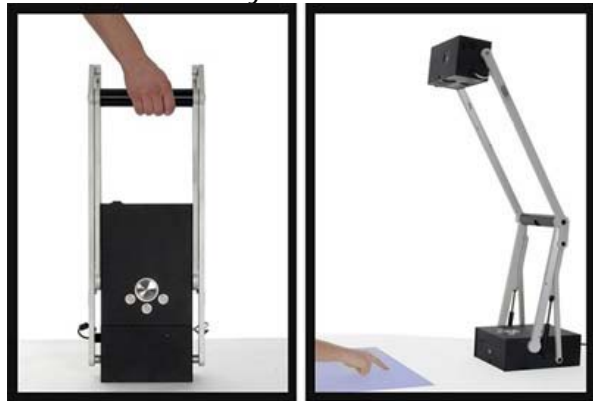
Thinker table & sheets
Patrick Jermann



Thinker sheets
Guillaume Zufferey



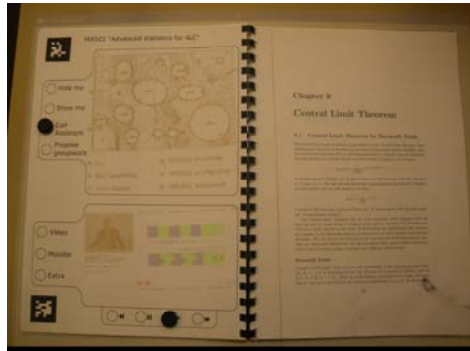
Lantern
Hamed Alavi



Docklamp
Son Do-Lenh



Roombots
Alexander Sproewitz



Augmented Polycop
Quentin Bonnard