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Zürcher Hochschule der Künste
Zurich University of the Arts

The 6th Korean-Swiss Science Days

New Worlds Beyond Reality

7-8 December 2015, Zurich University of the Arts (ZHdK)

Monday, 7 December 2015, Room ZT 5.K03 | Tuesday, 8 December 2015, Room ZT 5. K11

Schweizerische Eidgenossenschaft
Confédération suisse
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Embassy of Switzerland in the Republic of Korea

NRF National Research
Foundation of Korea

ETH Global

Contents

The 6th Korean-Swiss Science Days

New Worlds Beyond Reality

Concept

The Korean-Swiss Science Days are a series of annual conferences to foster the relations between Korea and Switzerland in science and technology. They are part of the bilateral Korean-Swiss Science and Technology Programme and provide a platform for researchers to meet and establish new collaboration and to present projects in research areas of mutual interest to both countries.

The 2015 edition aims to identify the new frontiers and trends in interaction design, animation, virtual reality and and full body immersion and introduce recent initiatives from Switzerland and Korea in this area. Leading researchers and students from both countries will be brought together to foster future collaboration and the exchange people. Apart from scientific presentations there will be social spaces and room for discussion between the participants.

Participants

Ca. 30 attendees from academia including senior researchers, junior researchers and students from Korea and Switzerland as well as representatives of Swiss start-ups in the game and virtual reality scene will attend the workshop.

Organizers

Scientific Chairs:	Max Rheiner, Zurich University of the Arts
	René Bauer, Zurich University of the Arts
Organization Switzerland:	Dr. Rahel Byland, ETH Zurich
	Lucia Arpagaus, ETH Zurich
Organization Korea:	Gyeong Min Nam, National Research Foundation of Korea

Funding

The Korean-Swiss Science Days are part of the bilateral Korean-Swiss Science and Technology Programme funded by the Swiss State Secretariat for Education, Research and Innovation (SERI) and the Korean Ministry of Science, ICT and Future Planning (MSIP). Travel for Korean participants is born by the Korean side through the National Research Foundation of Korea. All organizational costs and expenses for Swiss participants are covered by the funds provided from SERI administered by ETH Zurich as the Swiss Leading House. The Science Days are generally supported by the Science and Technology Office of the Swiss Embassy in Seoul.

Workshop Programme

Monday 7 December 2015, Room 5.K03

9:00-9:30   **Welcome addresses**

Rahel BYLAND (Programme Manager, ETH Zurich)
Ki Hyoung KIM (Director, National Research Foundation of Korea)
Christian SCHNEIDER (Head S&T Office, Swiss Embassy Seoul)

9:30–10:30   **Session 1: Full Body Immersion**

Max RHEINER (Zurich University of the Arts)
"Full Body Immersion as a Design Exploration"
Hyung Sook KIM (Inha University)
"Cultural Industry R&D Trends"

10:30-11:00   *Coffee Break, Gallery 2 5.K09*

11:00-12:30   **Session 1: Full Body Immersion continued**

Andrea SERINO (EPFL)
"Peripersonal space as the space of the self"
David O SULLIVAN (Pusan National University)
"tbd"
Ronan BOULIC (EPFL)
"Embodied Usability Assessment through Egocentric Mapping"

12:30-13:30   *Lunch Break, Gallery 2 5.K09*

13:30-15:00   **Session 2: Interaction Technology and Animation**

Otmar HILLIGES (ETH Zurich)
"Making everything interactive – new ways of interaction for AR/VR and mobile computing"
Kyung Doh KIM (Hongik University)
"Exploring a realistic and natural Pen Interaction UX"
Bob SUMNER (Disney Research Zurich/ETH Zurich)
"Amplifying Creativity in Animation and Games"

15:00-15:30   *Coffee Break, Gallery 2 5.K09*

15:30-17:00   **Session 2: Interaction Technology and Animation continued**

SoHyeon JEONG (ETH Zurich)
"Data-Driven Fluid Simulations using Regression Forests"
Ji Hyoun LIM (Ulsan National University of Science and Technology)
"UX Analysis on Gesture Interaction: from Semantic to Behaviour"
René BAUER (Zurich University of the Arts)
"Animation follows motivation design: The function of animation in the games Gabarello/Tornalino"

17:30-18:30   *Tram Sightseeing Tour of Zurich with on-board Apéro*

19:00   *Conference Reception "Zunfthaus zum Saffran"*

Tuesday 8 December 2015, Room 5.K11

9:00-10:30	**Session 3: Virtual Reality**

Caecilia CHARBONNIER (Artanim Foundation)
"Real Virtuality: combining motion capture and VR to freely move in space"
Sang-Goog LEE (The Catholic University of Korea)
"Development plan for domestic VR training system industry and research activities in Human Computer Interaction Lab"
Bruno HERBELIN (EPFL)
"Reality substitution and the bodily illusion of presence"

10:30-10:45	***Coffee Break, Gallery 2 5.K09***
10:45-12:15	**Session 3 continued:**

Janina WOODS (Ateo)
"Storytelling in Virtual Reality"
Young Jin HONG (Korea Institute of Robot and Convergence)
"Underwater cleaning robots & Virtual Reality"
Simon SCHUBIGER (University of Applied Science of Northwestern Switzerland)
"Creating Cityscapes for Virtual Reality Environments"

12:15-12:35	**Information on Funding Opportunities and Wrap up**

Andrea LANDOLT (Swiss National Science Foundation)
Max RHEINER (Zurich University of the Arts)

12:35-12:45	**Closing Words**

H.E. Sangkyu LEE (Ambassador of the Republic of Korea to Switzerland)

12:45-13:45	***Lunch Break, Gallery 2 5.K09***

Lab Tours

13:45-14:45	**"Birdly" at Zurich University of the Arts**

Max RHEINER
Zurich University of the Arts, Toni Areal

14:45-15:15	***Transfer by Tram***
15:15-16:00	**Disney Research Zurich**

Paul BEARDSLEY
Disney Research, Stampfenbachstrasse 48, Zürich 8006

16:15-17:00	**Virtual Reality Lab, ETH Zurich**

Christoph HÖLSCHER
ETH Zurich, Clausiusstrasse 59/RZ E 23, 8092 Zurich

Session 1

Full Body Immersion

Monday 7 December

Morning

Max Rheiner
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Full Body Immersion as a Design Exploration
Keywords: Virtual Reality, Full Body Immersion, Flying, Bird, Design, Arts, Exploration

The design/art research project Birdly is a full body immersion simulator. The goal of this project was to capture the intuitive feeling of a bird in flight and to study thereby how to evoke this experience with the means of Virtual Reality.

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Cultural Industry R&D Trends
Keywords:

Abstract not available.

Andrea Serino

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Peripersonal space as the space of the self

The experience of our embodied Self is not limited to the physical constraints of our body, but it extends into the space where the body interacts with the environment, i.e. peripersonal space (PPS). I will show how premotor and posterior-parietal brain regions represent PPS by integrating multisensory-motor signals related to the physical body and to the space immediately around it. I will show how the boundaries of PPS adapt as a function of experience, such as tool-use or self-other interactions. Finally, I will present new data suggesting a close relationship between the extent of PPS representation and Self-consciousness.

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Embodied Usability Assessment through Egocentric Mapping
Keywords: 3D immersive interactions, motion capture, virtual humans & avatars, Virtual Reality, Embodiment

Assessing the usability of complex 3D environments often requires to adopt the viewpoint of a broad range of potential future users. In this work we demonstrate how to map in real-time the full-body posture of a designer onto the one of a target user with potentially different size, volume and proportions. We propose a posture normalization technique to preserve self-contact consistency between the designer and a potential target user which is one necessary condition for feeling present in the virtual environment.

Session 2

Interaction Technology and Animation

Monday 7 December

Afternoon

Otmar Hilliges
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Making everything interactive – new ways of interaction for AR/VR and mobile computing
Keywords: HCI, input recognition, computational design

In this talk I will give a brief overview of the state-of-the art in input recognition and interaction techniques in a variety of emerging application domains spanning from augmented and virtual reality to mobile computing.

Kyung Doh Kim
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Real Virtuality: combining motion capture and VR to freely move in space
Keywords: Interaction, Soft Keyboard, Stylus pen, Tablet PC

Pen-based interaction is universally available on smart devices and especially on Tablet PCs. Previous studies compared various input methods like fingers, a mouse or a stylus pen on PCs or on a touchscreen based devices such as smart phones. At the same time, various soft keyboard applications are being developed on application stores of smart devices. Under this circumstances, we want to seek to find how to innovate and improve pen interaction user experience (UX) on smart devices. The pen and device were expected to realize offline pen interaction UX, but the functional aspects and affection parts are not satisfying us yet. Therefore, if we can enhance the UX by developing and innovating technologically and emotionally, the pen interaction UX will be excellent and will become common in all of the stylus pen application. However, since previous studies did not suggest which one is a suitable keyboard application for Tablet PCs when users perform a certain interaction as input type, we wanted to start with comparing two types of input methods (finger and pen) and three types of soft keyboard applications (QWERTY, Gesture and Swype) in a Tablet PC using performance measurements (accuracy and input speed) and discussing what types of applications showed better performance with each interaction on tablet PC. From these results, the recommendations for the keyboard types depending on the input methods on tablet PCs were developed.

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Amplifying Creativity in Animation and Games
Keywords: Animation, games, simulation

"Art challenges technology, and technology inspires art." John Lasseter used these words to describe his experience as an artist working with the technology leaders at Pixar three decades ago to pioneer what we know today as computer-generated animation. At the heart of this statement lies the idea that technology and art, when joined together, hold unique and promising potential to amplify creativity. This concept forms the central vision of the Animation and Games group at Disney Research Zurich. In this talk, I will present technology we've developed to help our artists better realize their creative visions. Attendees can expect examples in animation, simulation, interaction, and, in Disney style, a little bit of singing.
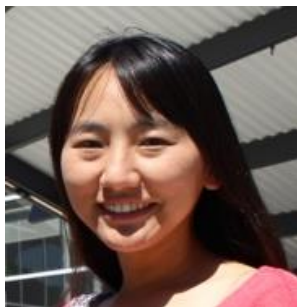
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Data-Driven Fluid Simulations using Regression Forests
Keywords: Machine-Learning, Regression Forests, Fluid Simulation

Traditional fluid simulations require large computational resources even for an average sized scene with the main bottleneck being a very small time step size, required to guarantee the stability of the solution. Despite a large progress in parallel computing and efficient algorithms for pressure computation in the recent years, realtime fluid simulations have been possible only under very restricted conditions. We propose a novel machine learning based approach that formulates physics-based fluid simulation as a regression problem, estimating the acceleration of every particle for each frame. We designed a feature vector, directly modelling individual forces and constraints from the Navier-Stokes equations, giving the method strong generalization properties to reliably predict positions and velocities of particles in a large time step setting on yet unseen test videos. We used a regression forest to approximate the behaviour of particles observed in the large training set of simulations obtained using a traditional solver. Our GPU implementation led to a speed-up of one to three orders of magnitude compared to the state-of-the-art position-based fluid solver and runs in real-time for systems with up to 2 million particles.

Ji Hyoun Lim

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UX Analysis on Gesture Interaction: from Semantic to Behaviour
Keywords: user model, gesture interaction, UX evaluation, semantic network analysis

Gesture is one well adopted alternative of Reality-Based Interaction for advanced technology. Semaphoric gesture is used for symbolic command and manipulative gesture is for direct manipulation or navigation of a system. Many studies have focused on the feasibility and performance of the newly proposed interactions, rather paid attention to user's real desires or expectations while they are using the new interaction technology.

Studies in this talk are the attempts to analyse gesture interaction with emphasis on human side. In the first study, we tried to draw the value structure users have in their mind using word co-occurrent based semantic network analysis. The second study presents the results of analysis to identify latent relationships between the set of human side gestures and the set of machine side commands. The last study illustrated the effect of visual feedback on the gesture variability. The three studies presented in this talk illustrated the ways to consider human factors in development of interaction technology.

René Bauer

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Animation follows motivation design (game mechanics): The function of animation in the games Gabarello/Tornalino (IMIC-Rehab-Games)
Keywords: Game mechanics, motivation design, animation, form follows function,
 mirror neurons, locomat, rehab, game design

Animation is part of the motivation design of a (rehabilitation) game. In the control loop of a game animation is used on all levels from the visualization of challenges, options, actions to the rewarding and punishment. In the project iMiC (Innovative Movement-Therapies in Childhood) we developed several robot-based-rehab-games and faced different questions: Should the game implement the mirror-neurons-theory, simulate the real walk cycle of the handicapped patient or do we visualize and reward a correct walk? All these questions relates to the discussion of body centred game mechanics and the function of animation in the game design. http://rehabconnex.zhdk.ch

Session 3

Virtual Reality
Tuesday 8 December
Morning

Caecilia Charbonnier
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Real Virtuality: combining motion capture and VR to freely move in space
Keywords: Motion capture, VR, full body immersion, low latency, wireless

Real Virtuality is a multi-user immersive platform combining a 3D environment – which can be seen and heard through a VR headset – with a real life stage set. Users are tracked by a motion capture system allowing them to see their own bodies and move physically in the virtual environment.

The experience offered by Real Virtuality brings a once in a lifetime experience. Unlike other static position VR systems, Real Virtuality allows users to become immersed in a VR scene by walking, running, interacting with physical objects and meeting other people. Because user's movement exactly match their avatars movements in the 3D environment and are streamed to the users with very low latency, there is no discomfort or interface required. The bodies of the visitors become the interface.

Sang-Goog Lee
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Development plan for domestic VR training system industry and research activities in Human Computer Interaction Lab
Keywords: Virtual Reality, Training System, Vision based User Interface, Brain Computer Interface, Health-care Signal Processing, Human Computer Interaction, and Wearable Computer

The current talk addresses an industrial importance of VR training system and some driving forces for the virtual reality training system industry in Korea. The talk highlights a VR training industry status and problems of the domestic VRTS industry. The development plan showed that a set of driving forces and a brief technology/business roadmap for encouraging VRTS industrialization in Korea. The talk will also introduce our Lab.'s recent research activities on several interaction technologies such as wearable input/output device, eye tracking method, method of feature extraction on motor imagery EEG, wearable-wellness garment system, and recommendation systems. At the end of the presentation, a possible joint study items will be discussed between Korea and Swiss participants of 'The 6th Korean-Swiss Science Days'.

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Reality substitution and the bodily illusion of presence
Keywords: Virtual reality, sense of presence, bodily illusions, cognitive science, embodiment

Virtual reality technologies are over 50 years old, yet still considered new and innovative today as they reach a larger public with widespread devices such as the oculus. Beyond the dreams of telepresence and cyberspace, scientific studies of the cognitive mechanisms of the sense of presence and of embodiment are required to fully comprehend how to master the art of virtual reality. To that end, the reality substitution machine (RealiSM) is an original and practical approach for the immersion in mixed-reality environments based on recent findings in cognitive neuroscience of bodily self-consciousness.

Janina Woods
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Storytelling in Virtual Reality
Keywords: Virtual Reality, Storytelling, 360° Content

Displaying any kind of content in Virtual Reality is a challenge. As game designers we build virtual worlds and tell stories with them, no matter if it's a game, a movie or a serious application. Storytelling in 360° is a careful balance between designing content and presenting it in a way that still relates to the user. We will showcase some of our previous work in VR and our current research.

Young Jin Hong

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Underwater cleaning robots & Virtual Reality
Keywords: Robots, VR

We introduce our underwater robots for sediment cleaning in reservoirs and coastal seabed, and describe how to evaluate the performance. Besides of our prototypes, we will show the commercialized robot of ours which has been used at many industrial spots and then ask some questions how to utilize VR for the quick design of underwater robots.

Simon Schubiger

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"Creating Cityscapes for Virtual Reality Environments"
Keywords: Virtual Reality Content Creation, 3D Cityscapes, Urban Design, Architecture, Procedural Modeling, CityEngine, Esri

Today's virtual reality environments see an increasing need for rapid 3D content creation. Many virtual rality applications are situated in an urban environment be it fictional or as-built. But creating 3D cities and urban environments is still one of the most difficult and time consuming modeling task. This talk will present how the procedural 3D modeling software Esri CityEngine can be successfully integrated into production pipelines for the efficient design and streamlined creation of cities for open world virtual reality applications.

Addresses and Contacts

Conference Venue

Zurich University of the Arts ZHdK
Toni Areal
Pfingstweidstrasse 96
8031 Zurich
https://www.zhdk.ch/index.php?id=tonicampus

Hotel

25hrs Hotel Zürich West
Pfingstweidstrasse 102
8005 Zurich
http://www.25hours-hotels.com/en/zurich-west/home/home.html

Transfer from the airport to the hotel by train:

Take train S16 leaving .02 or .32 to Bahnhof Hardbrücke.
Change to Tram Nr. 4 towards Bahnhof Altstetten and get off at Toni-Areal.
Travel time about 15 min, ticket price CHF 6.60

Alternatively, take any train to Zurich main station and then take tram Nr. 4 towards Bahnhof Altstetten and get off at Toni-Areal.
Travel time around 30 min, ticket price CHF 6.60

Apéro

Apéro tram leaving from the tram stop at Toni Areal (conference venue) at 17:30

Conference Dinner

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