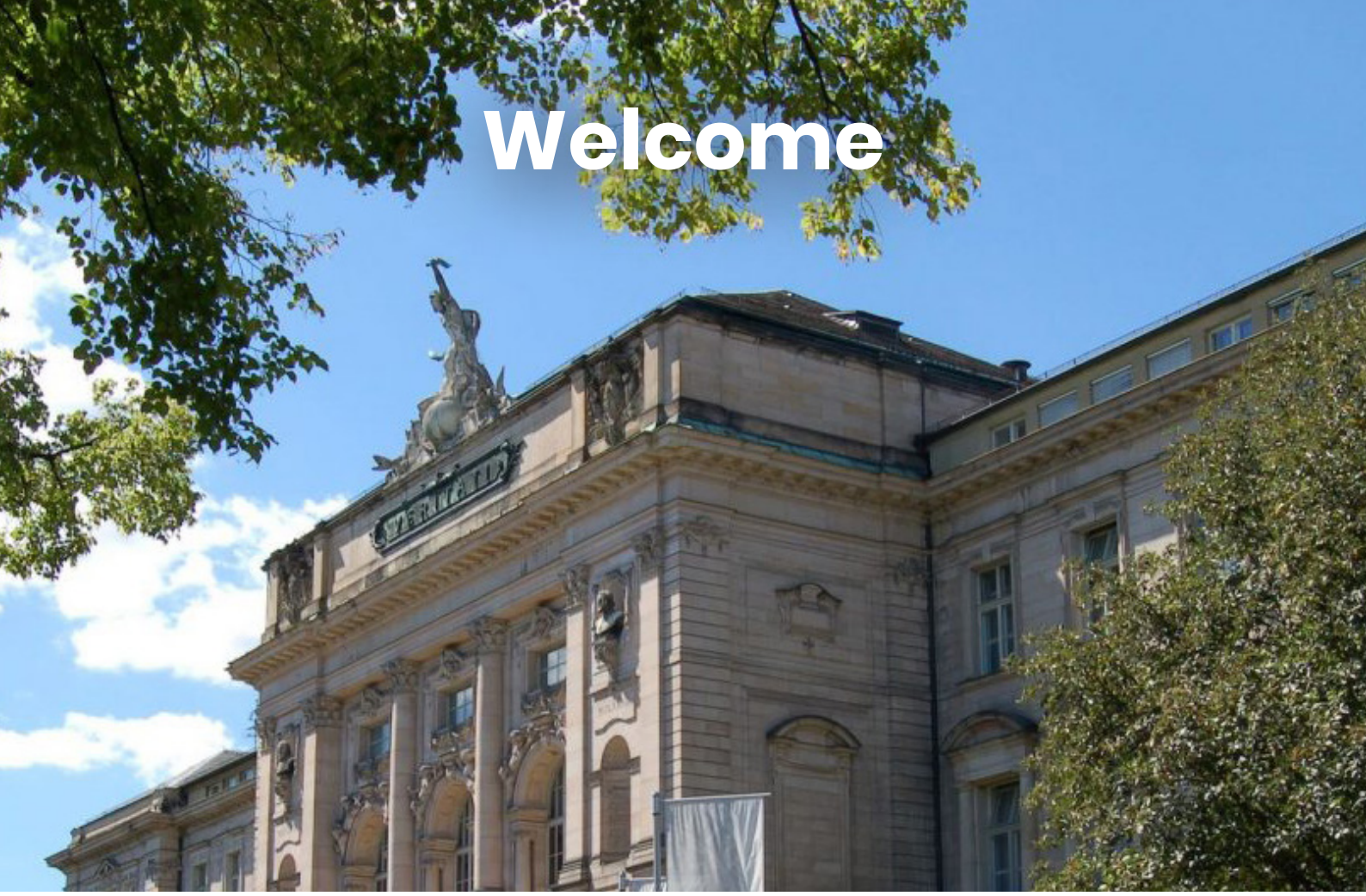
VS Games 2018

10th International Conference
on Virtual Worlds and Games for Serious Applications
Würzburg, Germany

Programme

Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG



Welcome

Dear participant of VS Games 2018,

It is a great pleasure to welcoming you to Würzburg!

With new consumer technologies and abound titles, serious games and virtual worlds have arrived at the centre of our society. This position raises awareness and appreciation from different directions including academia, culture, industry, and our social infrastructure. It also increases the stakes and strengthens our research.

The past 10 years of VS Games have documented and influenced this important process. Novel hardware and software technologies were applied, discussed and improved. Novel models, methodologies, and contents were invented, presented and evaluated. Often enough, rigorous systematic analyses of the resulting synergies between technologies and contents are the foundation for innovation and benefit to humankind.

VS Games provides a unique scientific ecosystem that promotes this interdisciplinary discourse. Terminologies, methodologies and perspectives from disciplines spanning a large range of contexts and objectives clash, merge and evolve into a new, multi-facetted field with tremendous transformative potential.

We appreciate your contribution and your presence at VS Games 2018, and we are convinced that it will play its part in unfolding said potential! That being said, we wish you an enjoyable stay and many exciting discussions!

Sebastian von Mammen
(General Chair VS-Games 2018)

Fotis Liarokapis
(General Co-Chair, VS-Games 2018)

Schedule

	Wednesday, 5. September	Thursday, 6. September	Friday, 7. September
8:00	*Registration*		
8:30	**Welcome**	*Registration*	
9:00	**Keynote:** Constantine Stephanidis	**Keynote:** Constance Steinkuehler	**Keynote:** Kurt Squire
10:00	*Poster Session/Coffee Break*	*Coffee Break*	
10:25	Session TECH I	Session EDU I	Session EDU II
12:00	*Lunch*		
13:30	Session HCI design	Session HCI tech I	Session TECH II
15:00	*Poster Session/Coffee Break*	*Coffee Break*	
15:30	Session HCI edu	Session HCI tech II	**Closing Session**
17:00	*End of sessions*		**Lab Tours**
19:00	**Reception:** Wenzelsaal	**Conference Dinner:** Backöfele	
22:00		**Guided Tour:** "Nightwatchmen"	

Outline

WIFI Access

Instructions for Wi-Fi access during the conference

Method I

1. Connect to Wi-Fi network with SSID “RZUW” using the password “Julius-Echter”
2. If not happening automatically, open a browser and go to https://login.rz.uni-wuerzburg.de/
3. Use “vsgames18” for username **and** password

Method II (Mobile)

1. Use the QR-Code below to connect to the network

1. Use the QR-Code below to login to the network

Proceedings

This years Proceedings can be acquired at https://go.uniwue.de/vsgames18proc
using the password “vsgames2018”

Schedule

Wednesday, September 5th

8:30 **Welcome**

9:00 **Keynote**

10:00 **Poster Session**

10:25 **Session TECH I, Chair: Daniel Roth**

10:25 - 10:50 Where's Pikachu: Route Optimization in Location-Based Games (full)
10:50 - 11:15 Validity of Virtual Reality Training for Motor Skill Development in a Serious Game (full)
11:15 - 11:30 A Model for Eye and Head Motion for Virtual Agents
11:30 - 11:45 Accommodating Stealth Assessment in Serious Games : Towards Developing A Generic Tool
11:45 - 12:00 Recreating Virtual Environments From User Traffic Patterns

13:30 **Session HCI design, Chair: Pejman Sajjadi**

13:30 - 13:45 Puzzle Walk: A Gamified Mobile App to Increase Physical Activity in Adults with Autism Spectrum Disorder
13:45 - 14:00 Effects of Graphical Styles on Emotional States for VR-Supported Psychotherapy
14:00 - 14:15 Using Think-aloud Protocol in Looking at the Framing of One's Character with a Case Study on Terraria
14:15 - 14:30 Balance Trucks: Using Crowd-Sourced Data to Procedurally-Generate Gameplay within Mobile Games
14:30 - 14:45 Improving Context Understanding in the Virtual World using Avatar's Affective Expressions to Reflect the Operators' Mental States
14:45 - 15:00 Multi-level Game Learning Analytics for Serious Games

15:00 **Poster Session**

15:30 **Session HCI edu, Chair: Carolin Wienrich**

15:30 - 15:55 Human-centered Design of a Virtual Reality Training Simulation for Mass Casualty Incidents (full)
15:55 - 16:20 Branded Gamification in Technical Education (full)
16:20 - 16:45 Evaluating the Effects of Realistic Communication Disruptions in VR Training for Aerial Firefighting (full)
16:45 - 17:00 Enable an Innovative Prolonged Exposure Therapy of Attention Deficits on Autism Spectrum through Adaptive Virtual Environments

19:00 **Reception**

Keynote

Constantine Stephanidis

Forth Institute for Computer Science

Serious Games in Intelligent Environments

This keynote presents an overview of the experience acquired in developing a number of serious games targeted to cultural and educational intelligent environments, such as museums, public spaces and schools, as well as smart homes. Various aspects and characteristics in this process are highlighted, focusing upon requirements for design, novel natural interaction techniques, user monitoring, adaptation and personalization, support for learning processes, in vivo deployment and user experience.

Biography

Constantine Stephanidis is Professor of Human Computer Interaction at the Department of Computer Science of the University of Crete. He is the Founder and Head (since 1989) of the Human-Computer Interaction Laboratory, and (since 2004) the Founder and Head of the Ambient Intelligence Programme at the Institute of Computer Science of FORTH, where he also served as Director between 2004 and 2016.

Over the past three decades, he has been engaged as the Prime Investigator and Scientific Responsible of well over a 100 projects funded by the European Commission, national agencies or industry, in areas of his competence. He is the Founder and Editor-in-Chief (since 2000) of the Springer international journal "Universal Access in the Information Society" and the co-Editor (since 2016) of the T&F International Journal of Human Computer Interaction.

He is the Editor and (co-)author of many chapters of the books "User Interfaces for All - concepts, methods and tools" published by LEA (2001) and "The Universal Access Handbook" published by T&F (2009). He has published more than 550 articles in scientific archival journals, proceedings of international conferences and workshops related to the fields of his expertise.
During 2008 – 2009, he served as member of the Sectoral Scientific Committee of Informatics of the National Council for Research and Technology (NCRT) and from 2014 to 2016 as member of the NCRT. In 2010 he was elected member of the Informatics Section of the Academia Europaea and since 2017 he is the President of the Council for Research and Innovation of the Region of Crete.

Presentations

Session TECH I
Chair: Daniel Roth

10:25 - 10:50

Where's Pikachu: Route Optimization in Location-Based Games (full)
Thomas Tregel, Philipp Müller, Stefan Göbel and Ralf Steinmetz

Along with the sudden rise in popularity of location-based games, the demand for tools to assist players in performance optimization increased. One major aspect lies within the analysis and planning of routes that contain a high amount of desirable game locations for the given player. However, personalized routes cannot be created by hand due to the amount of available in-game locations and the associated time constraints for real-world travel. This paper presents a system to dynamically create personalized route for players, based upon previous game data. These routes can be fully customized with regards to their time and location as well as the player's desired in-game goal, allowing them to e.g. specifically target their favourite species or maximize the amount of visited locations. The system is evaluated using a dataset of Berlin containing over 30.000 distinct locations with different associated in-game behaviour. Regarding the system's performance it is designed to work as an assistance system on a mobile device to assure its applicability in the context of location-based games.

10:50 -11:15

Validity of Virtual Reality Training for Motor Skill Development in a Serious Game (full)
Carlo Harvey, Elmedin Selmanovic, Jake O'Connor and Malek Chahin

Accurate simulation within virtual environments is a prerequisite of using these environments for training tasks. This accuracy has been shown to be a function of the fidelity in many senses. Virtual Reality (VR) has been used to aid in numerous training tasks through the implementation of pedagogical pro-cesses via the medium of serious games. This paper considers a complex motor task and whether VR is able to be used as a training environment for this task. Additionally we consider whether augmented virtuality improves task performance. The task being analysed is participant ability in a clay pigeon shooting simulator. Specifically, we evaluate if the type of training being presented influences the performance of participants in this task. VR affords the ability to provide supplementary information which is not typically available in a real-world equivalency. This paper presents a between-subjects repeated measures experiment to identify if the type of training being presented influences performance measures in the motor task. Clay pigeon shooting is considered to be a difficult sport as it requires depth-perception, lead calculation and accurate timing from the shooter. This paper shows that different types of training presented to a participant (N = 31) can influence their performance in this task, and that this skill development propagates into future repeated measures. It is also shown that training for this type of task, which is frame-critical, can be deployed with success into the safer environment of VR.

11:15 - 11:30

A Model for Eye and Head Motion for Virtual Agents
Jan Krejsa, Bojan Kerouš and Fotis Liarokapis

In this paper we propose a model for generating head and eye movements during gaze shifts of virtual characters, including eyelid and eyebrow motion. A user study with 30 participants was conducted to evaluate the communicative accuracy and perceived naturalness of the model. Results showed that the model communicates gaze targets with an accuracy that closely matches that of a human confederate, and participants subjectively rated the head and eye movements as natural (as opposed to artificial). The implementation can be used as-is in applications where virtual characters act as idle bystanders or observers, or it can be paired with a lip synchronization solution.

11:30 -11:45

Accommodating Stealth Assessment in Serious Games : Towards Developing A Generic Tool
Konstantinos Georgiadis, Giel van Lankveld, Kiavash Bahreini and Wim Westera

Stealth assessment derives the progression of learning in an unobtrusive way from observed gameplay captured in log files. To this end, it uses machine learning technologies to provide probabilistic reasoning over established latent competency variable models. Now that video games are increasingly being used for training and learning purposes, stealth assessment could provide an excellent means of monitoring learning progress without the need for explicit testing. However, applying stealth assessment is a complex and laborious process. This paper analyses the limitations of stealth assessment and conceptualizes the requirements for developing a generic tool that could overcome its barriers and accommodate its practical application. Hence, a framework is presented describing its user and functional requirements. The proposed generic solution could open up the wider uptake of stealth assessment in serious games.

11:45 - 12:00

Recreating Virtual Environments From User Traffic Patterns
Nick Murphy, Devan Patel, Drew Savas, Derek Martin, Chao Mei and Rongkai Guo

Virtual and Augmented Reality applications need a detailed model of the surrounding environment as well as their own location within it to provide users with immersive, interactive experiences. However, current techniques to build such models are often time-consuming, and require manual correction as the area they represent changes and evolves. As the model of the environment is often completed before the application put into use, it is unable to benefit from new information detected by the location's tracking sensors. This paper proposes a solution that utilizes aggregate position data from an area to develop that space's walkable mesh model. Participant locations were measured from Bluetooth Low Energy beacons via mobile devices, and that data set was then grouped together and filtered to produce an estimation of the total environment in the form of a two dimensional navigation mesh. The experiments produced several meshes that conformed to the walkable pathways of distinct layouts in an academic building.

Session HCI design
Chair: Pejman Sajjadi

13:30 - 13:45

Puzzle Walk: A Gamified Mobile App to Increase Physical Activity in Adults with Autism Spectrum Disorder

Daehyoung Lee, Georgia Frey, Alison Cheng and Patrick C. Shih

Research shows that adults with Autism Spectrum Disorder (ASD) are less physically active than those without ASD. Persuasive augmented reality smartphone apps may be an effective intervention to target this health disparity. A gamified mobile app, Puzzle Walk was developed to elevate physical activity (PA) engagement in the target population following an iterative user-centered design process, including a literature review, identification of target behaviors, needs analysis, health behavior theory evaluation, and prototype design. We found that walking is the most common form of PA in the target users and they have an affinity to using technology devices. These insights led us to design the Puzzle Walk app that incorporates behavior change techniques (BCTs) (e.g., user instruction, self-monitoring, visual rewards, feedback on performance, and goal-setting). We describe the emerged design that includes animated gamification and visualized user interfaces. The usability assessment plan is discussed as future work.

13:45 - 14:00

Effects of Graphical Styles on Emotional States for VR-Supported Psychotherapy

Niklas Kiefl, Paula Figas and Christoph Bichlmeier

Several medical domains investigated Virtual Reality (VR) as a supporting technology for teaching and training of novices and experts. In psychotherapy, VR has been identified also as a promising treatment instrument. This paper presents a study on VR assisted psychotherapy, evaluating the effects of graphical styles on emotional states of N=74 subjects. Assessed data has been used to first statistically check, if the presented VR-scenes can create a positive emotional effect, here relaxation. In addition, we examined the difference of changes of the emotional state with respect to two different graphical styles, both being typical for state-of-the-art video games. One of these styles is supposed to render highly realistic scenes at high computational costs. The second style has been deliberately chosen, to present an alternative requiring low performance devices such as mobile phones on wireless VR devices. As a third research target, we surveyed the difference of measured effects with respect to technical background knowledge of subjects. The study has been set up as a pre-study acquiring healthy students as subjects instead of patients suffering from psychological disorders.

14:00 - 14:15

Using Think-aloud Protocol in Looking at the Framing of One's Character with a Case Study on Terraria

Ji Soo Lim

How does a player interpret what occurs in a game? Fine explains that a player makes interpretations based on three levels of consciousness: as a character in a virtual game world, as a player who is playing the game, and as a person who is living in the real world. This study attempts to examine what happens in Terraria based on Fine's threelayered model and discuss the implications of Fine's model in digital games. The think-aloud method and interviews were used to look at how players interpret what is happening during the gameplay and to discuss the relationship between in-game characters and players from different aspects, such as identification, empathy, and prosocial behaviors.

14:15 - 14:30

Balance Trucks: Using Crowd-Sourced Data to Procedurally-Generate Gameplay within Mobile Games

Mark Lewis, Sylvester Arnab, Lorenz Klopfenstein, Luca Morini, Samantha Clarke, Alex Masters, Alessandro Bogliolo and Saverio Delpriori

Within the field of procedural content generation (PCG) research, the use of crowd-sensing data has, until now, primarily been used as a means of collecting information and generating feedback relating to player experience within games, and game aesthetics [1], [2]. However, crowd-sensing data can offer much more, supplying a seemingly untapped font of information which may be used within the creation of unique PCG game spaces or content, whilst providing a visible outlet for the dissemination of crowd-sensed material to users. This paper examines one such use of crowd-sensed data, the creation of a game which will reside within the CROWD4ROADS (C4RS) [3] application, SmartRoadSense (SRS) [4]. The authors will open with a brief discussion of PCG. Following this, an explanation of the features and aims of the SRS application will be provided. Finally, the paper will introduce 'Balance Trucks', the SRS game, discussing the concepts behind using crowd-sensed data within its design, its development and use of PCG.

14:30 - 14:45

Improving Context Understanding in the Virtual World using Avatar's Affective Expressions to Reflect the Operators' Mental States

Yoshimasa Ohmoto, Seiji Takeda and Toyoaki Nishida

Serious games are useful for acquiring various skills, but virtual experiences are often not commensurate with the real world. We believe that appropriate feedback can help operators who control avatars in the virtual world deepen their understanding of the relationship between the avatar and other characters in the virtual world. The aim of this study is to assist the operator to understand the context of a virtual world by using the avatar's affective expressions to reflect the operator's mental state. We conducted an experiment to investigate whether the appropriate feedback from the avatar's affective expressions can enhance the operator's understanding of the context in the virtual world. In the experiment, we used two types of avatars: a "feedback avatar" that provided feedback reflected the operator's mental states and an "expression avatar" that randomly provided the same affective expressions. As a result, we suggest that the affective expressions of the "feedback avatar" that were matched to the participants' mental states may enhance the understanding of the context of the avatar's character in the virtual world.

14:45 - 15:00

Multi-level Game Learning Analytics for Serious Games

Ivan Jose Perez-Colado, Dan Cristian Rotaru, Manuel Freire-Moran, Ivan Martinez-Ortiz and Baltasar Fernandez-Manjon

Serious games are usually used or deployed in an educational setting as an isolated or individual activity, disconnected from other curricular activities. However, to really increase the adoption of serious games in different educational scenarios, the combination and integration of games into the educational flow should be simplified. We envision Serious Games as new type of educational activity that can be combined as parts of other games (e.g. minigames integrated in larger games), integrated into other online activities, or even mixed with both game and non-game activities. In addition, if we want to make the most from serious games, a learning analytics system must be in place to harvest and analyze interactions, providing metrics and insights to instructors regarding the gameplay sessions. Moreover, if a course-level learning analytics strategy is designed, it must be aligned with the game learning analytics. This approach requires communication between games and educational activities used during the educational experience. From a game learning analytics standpoint, gaining insights from these integrated experiences introduces new requirements within potentially complex multi-level or hierarchical activities. Moreover, the analysis required to generate these metrics should be both efficient and provide insight in an understandable way and for different stakeholders. This paper describes an approach to multilevel game learning analytics from the perspectives of data model, implementation architecture, and result visualization in teacheroriented dashboards.

Session HCI edu
Chair: Carolin Wienrich

15:30 - 15:55

Human-centered Design of a Virtual Reality Training Simulation for Mass Casualty Incidents (full)

Henrik Berndt, Daniel Wessel, Tilo Mentler and Michael Herczeg

The triage process in mass casualty incidents is a rare but highly mission critical task. First responding emergency medical personnel are confronted with high numbers of casualties and must quickly and correctly decide about severity of injuries and immediate care for every casualty. Consequently, effective training is crucial. Current training methods are either low in immersion and presence or both costly and resource-intensive. In this paper we present a virtual reality training simulation that aims to combine the best of both approaches. We use a human-centered design process and present a case study with 10 members of emergency medical services to outline design implications. While potential for optimization was identified, the evaluation results show the use of the simulation for triage training.

15:55 - 16:20

Branded Gamification in Technical Education (full)

Annika Sabrina Schulz, Franziska Schulz, Rúben Gouveia and Oliver Korn

Brand identification has the potential of shaping individuals' attitudes, performance and commitment within learning and work contexts. We explore these effects, by incorporating elements of branded identification within gamified environments. We report a study with 44 employees, in which task performance and emotional outcomes are assessed in a real-world assembly scenario – namely, while performing a soldering task. Our results indicate that brand identification has a direct impact on individuals' attitude towards the task at hand: while instigating positive emotions, aversion and reactance also arise.

16:20 - 16:45

Evaluating the Effects of Realistic Communication Disruptions in VR Training for Aerial Firefighting (full)

Rory Clifford, Simon Hoermann, Mark Billinghurst, Nicolas Marcadet, Hamish Oliver and Robert W. Lindeman

Aerial firefighting takes place in stressful environments where decision making and communication are paramount, and skills need to be practiced and trained regularly. An experiment was performed to test the effects of disrupting the communications ability of the users on their stress levels in a noisy environment. The goal of this research is to investigate how realistic disruption of communication systems can be simulated in a virtual environment and to what extent they induce stress. We found that aerial firefighting experts maintained a better Heart Rate Variability (HRV) during disruptions than novices. Experts showed better ability to manage stress based on the change in HRV during the experiment. Our main finding is that communication disruptions in virtual reality (e.g., broken transmissions) significantly impacted the level of stress experienced by participants.

16:45 - 17:00

Enable an Innovative Prolonged Exposure Therapy of Attention Deficits on Autism Spectrum through Adaptive Virtual Environments

Chao Mei and Rongkai Guo

A prototype of adaptive virtual environments therapy system (AVET) was developed which will enable innovative Virtual Reality (VR)-based therapy approach for children with attention deficit on the autism spectrum. Many systems have successfully used VR in Autism Spectrum Disorders (ASD) therapies. Most of them use VR as an alternative way to conduct therapies by simulating traditional therapies or real-life experiences. The AVET employed VR-exclusive "impossible experiences" (e.g., a chair that deforms upon the user's gaze, a transparent human) which are not available in real world. The AVET identifies, influences the user's cognition, and delivers a customized Prolonged Exposure (PE)-style VR therapy for children with attention deficits on the autism spectrum. We conducted a preliminary evaluation to the current AVET prototype with the experts. Based on the interview feedbacks, we anticipate the AVET will have a great potential to deliver innovative and effective ASD attention training therapies.

Poster Session

Low-Frequency Stress Elicitation for VR Training

Jean-Luc Lugrin, Henrik Dudaczy and Marc Erich Latoschik

Low-frequency sounds have been reported to elicit stress and discomfort under certain conditions. This is a very interesting effect for Virtual Reality (VR) training simulations focusing on skill acquisition and practice under stressful conditions, such as doctors, surgeons, firefighters, airline pilots, police officers, teachers or even teachers or university professors. Lowfrequency sounds can be easily added to existing VR simulations to create more realistic stressful situations. However, they may have major health risks. The range, amplitude, and exposition duration to which low-frequency could be safely and efficiently used in VR are still unknown. With this paper, we aim to foster more research on the topic by providing a concise summary of previous work as well as suggesting a possible low-frequency condition suspected to safely increase stress.

A Location-Based VR Museum

Jean-Luc Lugrin, Florian Kern, Ruben Schmidt, Constantin Kleinbeck, Daniel Roth, Christian Daxer, Tobias Feigl, Christopher Mutschler, Marc Erich Latoschik

This poster presents a novel type of Virtual Reality (VR) application for education and culture: a location-based VR Museum, which is a large-room scale multi-user multi-zone virtual museum. This VR museum was designed to support over 100 simultaneous users, walking in a large tracking system (600 m2) and sharing a ten times bigger virtual space (7000 m2) containing indoor and outdoor dinosaur exhibitions. This poster is giving an overview of the system and its main features as well as discussing its potential benefits and future evaluation.

A medical serious games framework hierarchy for validity

Agali Mert, Tanja Nijboer, Bart Doyen, Henriëtte Meijer and Mary Dankbaar

Meta-analyses or critical reviews in medical research concerning serious games focus on outcome measures like for example daily pain. They however do not take into account the effectiveness of the serious game in relation to the constructs used in the design of the game. This is a possible explanation why there is a vast heterogeneity in results of serious games research in the medical profession, but maybe also for the relatively poor results of serious games in health care. A comprehensive hierarchy for validity in serious games research in health care is proposed where concepts as content validity, concurrent validity and predictive validity are addressed. This can aid researchers in inclusion or exclusion of serious games articles in meta-analyses or critical reviews.

Gamified Knowledge Encoding: Knowledge Training Using Game Mechanics

Sebastian Oberdörfer and Marc Erich Latoschik

Game mechanics (GMs) encode a game's rules, underlying principles and overall knowledge. During the gameplay, players practice this knowledge due to repetition and compile mental models for it. Mental models allow for a training transfer from a training context to a different context. Hence, as GMs can encode any knowledge, they can also encode specific learning contents as their rules and be used for an effective transfer-oriented knowledge training. In this article, we propose the Gamified Knowledge Encoding model (GKE) that not only describes a direct knowledge encoding of a specific learning content in GMs, but also defines their training effects. Ultimately, the GKE can be used as an underlying guideline to develop welltailored game-based training environments.

The impact of Pokémon Go and why it's not about Augmented Reality - Results from a Qualitative Survey

Daniel Rapp, Florian Niebling and Marc Erich Latoschik

Pokémon Go is a mobile game that uses geolocation and Augmented Reality (AR) to bring little monsters into the real world. In this paper, we want to outline a qualitative study which focuses on socio-technical effects of this game onto the players themselves. Episodical interviews are used to collect data which is then coded by an approach close to Grounded Theory. The results contain theories with quotations from the participants. On the technical side, players judge AR as hardly relevant for the game and more useful for advertisement through media coverage. Even though Pokémon Go is an AR game, this feature is optional and suffers from bad usability.

Rallye Game: Learning by Playing with Racing Cars

Bahar Kutun and Werner Schmidt

In the past lecturer-centered lecture – nowadays interactive lecture in higher education. Various methods for the interactive design of a lecture are used. Motivation is the basic building block for successful learning. Gamification pursues the approach by using game mechanics to motivate the participants and to effect a long-lasting change of behavior. We followed the idea of gamification and developed a rallye game to transfer knowledge in the field of Business Process Management (BPM). The flexible concept of the rallye allows changing the content, so that it can be transferred to other areas, e.g., for training purposes in companies. The prototype was tested and evaluated in the BPM class of the Bachelor's program 'Digital Business' at the Technische Hochschule Ingolstadt. The results were promising and prove an increase in student motivation by the developed game.

Schedule

Thursday, September 6th

9:00 Keynote

10:25 Session EDU I, Chair: Carlo Harvey

10:25 - 10:50 Effective Orbital Mechanics Knowledge Training Using Game Mechanics (full)
10:50 - 11:15 Designing Augmented and Virtual Reality Applications with Pre-Service Teachers (full)
11:15 - 11:30 Pathomon: A Social Augmented Reality Serious Game
11:30 - 11:45 Game-Based Course Design: A New Approach for Effective Online Teaching
11:45 - 12:00 Enhancing Progressive Education Through the Use of Serious Games

13:30 Session HCI tech I, Chair: Fotis Liarokapis

13:30 - 13:55 Learnings and Challenges in Designing Gamifications for Mental Healthcare: The Case Study of the ReadySetGoals Application (full)
13:55 - 14:20 A virtual nose as a rest-frame - the impact on simulator sickness and game experience (full)
14:20 - 14:45 On The Effect of a Personality-Driven ECA on Perceived Social Presence & Game Experience in VR (full)
14:45 - 15:00 How Real Can Virtual Become? The Relation between Simulation and Reality Exemplified by the Digital Experiment

15:30 Session HCI tech II, Chair: John Edison Muñoz

15:30 - 15:55 Comparison of Teleportation and Fixed Track Driving in VR (full)
15:55 - 16:20 Towards Serious Games and Applications in Smart Substitutional Reality (full)
16:20 - 16:45 An Embodied Learning Game using Kinect and Labanotation for Analysis and Visualization of Dance Kinesiology (full)
16:45 - 17:00 LUTE: A Locomotion Usability Test Environment for Virtual Reality

19:00 Reception

Keynote

Constance Steinkühler

UCI Department of Informatics

Understanding and Enriching Esports

Esports are a rapidly growing entertainment source in countries around the world. In the US, such competitions are broadening to a larger audience every day. Distinct from other forms of gameplay, esports are organized videogame competitions and the infrastructure built around them. They are played by highly skilled players that train daily, are recruited to teams, and earn prize money, scholarships, and glory for competing. In fact, a growing number of universities in the United States have begun to offer scholarships to top performing esport players to compete as part of their school's team, with 344 students from 24 universities have receiving a collective $3M+ in scholarship tuition packages (Kozachuk, 2017) to date. As this number grows, we also begin to see esport competitions being held at the high school level. As esports mainstreams as a form of entertainment, esports competitors, professionals, and fans become not only a strong economic driver but also an innovative space for research on training, teaching, and serious games.

In this presentation, I review the rise of esports in the US, highlighting the emerging academic research agenda on esports in higher education and the professional training and development practices of teams to date. I then describe a recent effort, the North America Scholastic Esports Federation, to leverage esports as a vehicle for learning in STEM, English Language Arts, Career Technical Pathways, and social-emotional learning. I describe the year one findings from the project and how this effort fits into the larger, emerging ecosystem of esports in the US. While more than a decade of research highlights the cognitive, educational, and social benefits of videogames for impact (both reframed commercial titles and novel videogames designed to intentionally educate), this new frame of digital games as sports raises a host of new research questions and issues for the field.

Biography

Constance Steinkuehler is a Professor of Informatics at the University of California, Irvine where she investigates cognition and learning in multiplayer videogames, gamer culture, and esports. Her research investigates the intellectual (reasoning, literacy, STEM) and social-emotional aspects of gameplay. Her current projects include an esports league for high schoolers (including a year-long public high school course connecting esports to STEM Entrepreneurship), advances in methodologies for studying online reasoning, and a book for parents of gamer kids.

Constance formerly served as Senior Policy Analyst under the Obama administration in the White House Office of Science and Technology Policy, advising on games and digital media. She is a founding fellow of the Higher Education Video Games Alliance, an academic organization of game-related programs in higher education. Her research has been funded by the Samueli Foundation, the MacArthur Foundation, the Gates Foundation, the National Academy of Education/Spencer Foundation, the National Science Foundation, and Cambridge University. She has published over ninety articles and book chapters including three special journal issues and two books. She has worked closely with the National Academy of Sciences and National Academy of Education on special reports relate to videogames, and her work has been featured in Science, Wired, USA Today, New York Times, LA Times, ABC, CBS, CNN NPR, BBC and The Chronicle of Higher Education.

Constance has a PhD in Literacy Studies, an MS in Educational Psychology, and three Bachelor Degrees in Mathematics, English, and Religious Studies. Her dissertation was a cognitive ethnography of the MMOs Lineage I and II where she served as siege princess for the LegendsOfAden guild. Her husband Kurt Squire is an educational game designer and scholar. They live with their two little gamers in Southern California.

Presentations

Session EDU I
Chair: Carlo Harvey

10:25 - 10:50

Effective Orbital Mechanics Knowledge Training Using Game Mechanics (full)

Sebastian Oberdörfer and Marc Erich Latoschik

Computer games consist of game mechanics (GMs) that encode a game's rules, principles and overall knowledge thus structuring the gameplay. These knowledge rules can also consist of information relevant to a specific learning content. This knowledge then is required and trained by periodically executing the GMs during the gameplay. Simultaneously, GMs demonstrate the encoded knowledge in an audiovisual way. Hence, GMs create learning affordances for the learning content thus requiring its application and informing about the underlying principles. However, it is still unclear how knowledge can directly be encoded and trained using GMs. Therefore, this paper analyzes the GMs used in the computer game Kerbal Space Program (KSP) to identify the encoded knowledge and to predict their training effects. Also, we report the results of a study testing the training effects of KSP when played as a regular game and when used as a specific training environment. The results indicate a highly motivating and effective knowledge training using the identified GMs.

10:50 -11:15

Designing Augmented and Virtual Reality Applications with Pre-Service Teachers (full)

Kristina Bucher and Silke Grafe

Numerous Studies and new applications like Google Expeditions or Anatomy 4D point to a great potential of Augmented and Virtual Reality for its use for educational purposes. However, related research concerning technology integration in the classroom has shown that a valuable medium alone does not automatically lead to its successful use. It is therefore the aim of the paper to present an approach by which competencies of pre-service teachers for a successful and appropriate integration of Augmented and Virtual Reality-applications in the classroom are fostered – the own design of Augmented and Virtual Reality applications. We will begin with a short discussion of prominent findings and related work in regard to teaching and learning with and about Augmented and Virtual Reality in the first part before introducing the main goals and aspects of the presented pedagogical concept and the seminar in the second part of the paper. In the third part, two applications created in the seminar and qualitative data from an explorative study based on focus group interviews and participant observation will be presented. We close with a discussion of our findings and an outlook to future work.

11:15 - 11:30

Pathomon: A Social Augmented Reality Serious Game

Daniel Rapp, Jonas Müller, Kristina Bucher and Sebastian von Mammen

The release of Pokémon GO attracted a huge player base ranging from children to adults, thereby establishing augmented reality (AR) on the mass market. In this paper, we present Pathomon, a social AR serious game which combines the location-based game mechanics of Pokémon GO with the benefits of using AR in a serious context. We describe the concept of the game which is based on cooperatively scanning QR codes, enabling the players to work together towards their common goal of eradicating viruses in their environment, while at the same time acquiring knowledge about these viruses. Furthermore, we present a first user study suggesting favorable results with respect to game experience, yet indicating room for improvement concerning the social game aspects. Finally, we outline the opportunity of the game to serve as a starting point for the development of a more versatile social AR platform capable of including arbitrary contents beyond the context of virus infections.

11:30 -11:45

Game-Based Course Design: A New Approach for Effective Online Teaching

Wenting Weng, Amber Muenzenberger and André Thomas

The following short paper presents the methodology used to create a game-based course (GBC) with Variant: Limits™. The course was designed to make game-based learning and an educational game the core of the course instruction to increase student engagement, motivation, knowledge gain and knowledge retention while learning calculus. Variant: Limits™, an educational video focuses on the conceptual understanding of complex calculus concepts. The GBC course was developed to be a four-week online course taught at Texas A&M University. While the game is the center of course design, a game-based learning model was applied to guide the design that enables to integrate gameplay experience with real-world subject learning. Students were able to maximize the application of the game while learning calculus. At the conclusion of the GBC, the overall results show that students were engaged in the game and course, as well as gaining a deeper understanding of the mathematical concepts presented within Variant: Limits.

11:45 - 12:00

Enhancing Progressive Education Through the Use of Serious Games

Belma Ramic-Brkic

The increasing body of research is focused on developing tools and applications that aid the learning process of children with or without disabilities. However, learning by gaming is still not recognized by formal educational systems. The author believes that the application of this approach is particularly slow at the level of primary and secondary education in countries with low and middle income, such as Bosnia and Herzegovina. Integrating serious games into curricula in these contexts could significantly benefit the students, as well as the community in general. This work, therefore, promotes technology as one of the crucial educational and pedagogical components. It provides an overview of selected educational games created for pre-school and elementary school children with specific learning intentions revolving around alphabet, colours and elementary science. A pilot study was performed with neuro-typical and neuro-atypical children, and professionals working at an NGO “EDUS Education for All”. The findings show that both students and instructors have a positive attitude towards the game design and logic, and more importantly, towards the technology itself. In the end, we believe that the games presented in this paper can be valuable resources for teachers, as well as for children and parents.

Session HCI tech I
Chair: Fotis Liarokapis

13:30 - 13:55

Learnings and Challenges in Designing Gamifications for Mental Healthcare: The Case Study of the ReadySetGoals Application (full)

Panote Siriaraya, Valentijn Visch, Marierose van Dooren and Renske Spijkerman

Although the potential benefits of applying game design techniques for healthcare purposes has been recognized in the past, there has not yet been much research on how such applied games could be created and used in practice. This paper presents the learnings and challenges for designing such a game from a research through design perspective. Central in this paper is the process employed to design the ReadySetGoals, a gamified mobile application aimed at supporting therapeutic goal setting within a substance addiction treatment context. The design process involved four key stages. 1) The 'transfer effect' was identified and then 2) The 'Real World' context examined. 3) Different gamification concepts were evaluated and a "core gamification loop" was designed. 4) The ReadySetGoals was then prototyped, user tested and iteratively refined. During the design process, three key learnings emerged and are discussed: 1) Aligning stakeholder expectations though framing 2)Integrating real world therapeutic aspects in a game world experience and 3) The value of personalization.

13:55 - 14:20

A virtual nose as a rest-frame - the impact on simulator sickness and game experience (full)

Carolin Wienrich, Christine Weidner, Celina Schatto, David Obremski and Johann Habakuk Israel

This paper presents an experiment measuring the impact of a virtual nose on simulator sickness and game experience in a virtual reality game presented on an Oculus Rift DK 2. Furthermore, the presented study investigated in the significance of the rest-frame's salience, for it to reduce simulator sickness. The results of our study indicated that the usage of a virtual nose reduces simulator sickness while it does not affect the game experience. Further results showed no significant impact of the rest-frame's salience, neither on simulator sickness nor on the game experience. In sum, the outcome of the study supports the thesis that a rest-frame in form of a virtual nose can be used in virtual reality applications to reduce simulator sickness.

14:20 - 14:45

On The Effect of a Personality-Driven ECA on Perceived Social Presence & Game Experience in VR (full)

Pejman Sajjadi, Philipp Cimiano, Stefan Kopp and Laura Hoffmann

We report on an experiment that investigates the effect of a personality-driven embodied conversational agent (ECA) on perceived social presence and game experience in virtual reality. The experiment used three conditions: one with no apparent non-verbal behavior by the ECA, one with non-verbal behavior governed by an extrovert-based emotional model, and one with an introvert-based emotional model, in the context of negative evaluation of a virtual employee's performance. The results indicate that the overall perceived social presence and game experience across all conditions were quite high. Moreover, people who were exposed to the extrovert-based condition experienced significantly higher levels of behavioral involvement as part of their social presence compared to the other two conditions. Furthermore, no significant differences between the game experience of participants across the different conditions were observed. These results suggest that the projection of nonverbal behavior as a result of incorporating personality as part of the emotional model of an ECA could have an influence on the elicited feeling of social presence from the users with respect to behavioral involvement; and more assertive and pronounced non-verbal behaviors seem to have higher impacts, than their submissive and minimal counterparts.

14:45 - 15:00

How Real Can Virtual Become?

Manuela Pietraß

It is a widespread notion that heightening the perceivable 'realness' – the iconical similarity between virtual reality (VR) and reality – would improve presence, i. e. the impression of realness. If it were like this, VR would be a minor type of reality as long as it were distinguishable from reality. However, which sense would a VR environment make, if it were possible to let it seem indistinguishable from reality? On the example of virtual moral experiments, the article shows that awareness of the virtual state is crucial for creating presence.

Session HCI tech II
Chair: John Edison Muñoz

15:30 - 15:55

Comparison of Teleportation and Fixed Track Driving in VR (full)

Pall Lindal, Kamilla Johannsdottir, Unnar Kristjansson, Nina Lensing, Anna Stuehmeier, Annika Wohlan and Hannes Vilhjalmsson

Comfortable locomotion in VR based games is crucial. Simulation sickness, caused by fast optical movement, lag or mismatch in forces, threatens this comfort and fosters a negative attitude towards further VR experiences. The design of the locomotion interface has a direct impact on the likelihood of inducing sickness. General paradigms and guidelines are being adopted by the game development community, but more data is needed.We use both subjective and objective methods to compare two common modes of travel, teleportation and driving along a fixed track. Our results show that teleportation causes fewer symptoms of sickness and leaves a more positive impression of VR.

15:55 - 16:20

Towards Serious Games and Applications in Smart Substitutional Reality (full)

Benjamin Eckstein, Eva Krapp and Birgit Lugrin

Substitutional Reality (SR), the integration of the physical environment into Virtual Reality (VR), is a novel approach to facilitate and intensify the use of home-based VR systems. We propose to extend the passive haptics of SR with the interactive functionality of a smart home environment. This concept of smart SR is meant as a foundation for serious games and applications. In this paper, we describe the concept behind smart SR as well as the prototype in our lab environment. We created multiple virtual environments with a varying degree of mismatch regarding the real world. We present a user study where we examined the influence of these environments on the perceived sense of presence and motivation of users. Our findings showed that presence was high in all conditions while motivation increased with the level of mismatch. This provides us with a promising basis for further research.

16:20 - 16:45

An Embodied Learning Game using Kinect and Labanotation for Analysis and Visualization of Dance Kinesiology (full)

Ioannis Rallis, Apostolos Langis, Ioannis Georgoulas, Athanasios Voulodimos, Nikolaos Doulamis and Anastasios Doulamis

In this paper, we present an educational framework for analysis and visualization of dance kinesiology based on Labanotation and embodied learning concepts. The low-cost Kinect sensor is employed to extract skeletal data which are then processed and transformed geometrically. In the sequel, they are analyzed based on the Labanotation system to characterize the posture of the human limbs. Two modules have been developed. The first module serves for recording, analyzing and visualizing body movements. The second module is an application in which the user is required to perform with his upper limbs, a sequence of gestures given by the system in the form of Labanotation symbols. Dance notation consists of a set of symbols and rules for recording dance (or movement in general), in a similar way that music notation records music. The fact that Labanotation is recognized as one of the most widely used and accurate notation systems for recording dance highlights the proposed framework's applicability and potential as an educational visualization tool.

16:45 - 17:00

LUTE: A Locomotion Usability Test Environment for Virtual Reality

Bhuvaneswari Sarupuri, Simon Hoermann, Mary C. Whitton and Robert W. Lindeman

Locomotion is one of the most basic interactions in virtual reality applications, and many techniques have been developed for moving in virtual environments. However, each technique works well in different scenarios, and is tested and evaluated in different test environments and on different tasks. To date, there has not been a common standard test bed which accommodates long, medium and short distance travel that would support testing and comparing locomotion techniques. This paper describes a novel testing environment for VR locomotion techniques, and explains the parameters that can be manipulated depending on the locomotion technique and the task. It also discusses the other possible attributes that can be included in future versions of the test environment.

Schedule
Friday, September 7th

9:00 Keynote

10:25 Session EDU II, Chair: Kristina Bucher

10:25 - 10:50 Effectivity of Affine Transformation Knowledge Training Using Game Mechanics (full)
10:50 - 11:15 Piloting two Educational Games in five European Countries: Teachers' Perceptions of Student Motivation and Classroom Engagement (full)
11:15 - 11:40 Assessment in Serious Alternate Reality Games (full)
11:40 - 12:00 MoMaP – An interactive gamified app for the Museum of Mineralogy

13:30 Session HCI tech II, Chair: Andreas Knote

13:30 - 13:45 Efficient in-game communication in collaborative online multiplayer games
13:45 - 14:00 Measured and Perceived Physical Responses in Multidimensional Fitness Training through Exergames in Older adults
14:00 - 14:15 A Multisensory 3D Environment as Intervention to Aid Reading in Dyslexia: A Proposed Framework
14:15 - 14:30 Dynamic Systems Theory in Human Movement: Exploring Coordination Patterns by Angle-Angle Diagrams Using Kinect
14:30 - 14:45 Towards Robust 3D Skeleton Tracking Using Data Fusion from Multiple Depth Sensors
14:45 - 15:00 Image Warping using WebGL for a Smart Avatar Animating Body Weight Evolution

15:30 Closing Session

19:00 Reception

Keynote

Kurt Dean Squire

UCI Department of Informatics

Biography

Kurt Squire is a professor of Informatics at UC, Irvine and the author of over 100 academic articles, 20 pieces of software, and author / editor of 3 books on games and learning. His work has been supported by numerous private and public foundations and groups and his games have been played by 100,000s across the world.

Presentations

Session EDU II
Chair: Kristina Bucher

10:25 - 10:50

Effectivity of Affine Transformation Knowledge Training Using Game Mechanics (full)

Sebastian Oberdörfer and Marc Erich Latoschik

The Gamified Training Environment for Affine Transformation (GEtiT) was developed as a demonstrator for the Gamified Knowledge Encoding model (GKE). The GKE is a novel framework that defines knowledge training using game mechanics (GMs). It describes the process of directly encoding learning contents in GMs to allow for an engaging and effective transfer-oriented knowledge training. Overall, GEtiT is developed to facilitate the training process of the complex and abstract Affine Transformation (AT) knowledge. The complexity of the AT makes it hard to demonstrate this learning content thus learners frequently experience issues when trying to develop an understanding for its application. During the gameplay, the application of the AT's mathematical grounded aspects is required and information about the underlying principles are provided. In this article, a short overview over GEtiT's structure and the knowledge encoding process is given. Also, this article presents the results of a study measuring the training effectivity and motivational aspects of GEtiT. The results indicate a training outcome similar to a traditional paper-based training method but a higher motivation of the GEtiT players. Hence, GEtiT yields a higher learning quality.

10:50 -11:15

Piloting two Educational Games in five European Countries: Teachers' Perceptions of Student Motivation and Classroom Engagement (full)

Jennifer Tiede and Silke Grafe

The following article will present first results from a project that explored the application of two educational games in school classes. The project included 20 teachers from Italy, Portugal, Norway, Poland, and Greece. The learning games used in this pilot were Variant: Limits™, an educational mathematics game about calculus, and ARTé: Mecenas™, an educational art history game about the Italian Renaissance, both by Triseum™, an educational game studio based in the US. The scientific evaluation of the game-based learning pilot included focus groups and focused on aspects of application modes and effects on student motivation, classroom engagement, and learning outcomes. In the following, the focus group results for motivation and classroom engagement will be introduced, and first conclusions will be drawn regarding the respective effects on students as perceived by the teachers. The overall results show that both games were successful in stimulating motivation and classroom engagement with the students, even though the effects varied between the two games in certain regards and were discovered to depend on numerous factors in the context of interpersonal differences.

11:15 - 11:40

Assessment in Serious Alternate Reality Games (full)

Rónán Lynch, Bride Mallon and Cornelia Connolly

The pedagogical application of Alternate Reality Games (ARGs) is relatively new, and there is little knowledge in how to align ARGs and Game-Based Learning (GBL). Presented is a design-based research study that included the creation of an artefact, Plunkett's Pages, an ARG designed to teach players about events from Ireland's rebellious 1916 Easter Rising. The ARG portrays the actual events of the era through interactive storytelling, detective work, social media, and multimedia technologies and produces a collaborative, treasure-hunt style game as players go on a voyage of discovering the missing pages of a rebel's diary in a bid to uncover the 'truth' behind 1916. The study of Plunkett's Pages provides insights into the pedagogical application of such games, addressing the challenge of reconstructing a century-old narrative for the digital age. Lessons are abstracted as guidelines to assist game designers and educators in the creation and management of quality Serious ARGs. One such guideline, Assessment, is detailed herein.

11:40-11:55

MoMaP – An interactive gamified app for the Museum of Mineralogy

Georgia Andritsou, Vivi Katifori, Vassilis Kourtis and Yannis Ioannidis

This work presents an Android application using Near Field Communication developed with the aim to inspire the visitors of the Athens University Museum of Mineralogy and Petrology to focus on the details of the exhibits. The MoMaP application uses a gamification approach prompting the visitors to collect points in a game in which they participate alongside the tour and enables them to share their experience in the museum with others and eventually build a personalized digital souvenir. The application can be used for both educational and recreational purposes. After completing the implementation of the application, we conducted an evaluation with the help of several visitors of the museum.

Session HCI tech II
Chair: Andreas Knote

13:30 - 13:45

Efficient in-game communication in collaborative online multiplayer games

Fotios Spyridonis, Damon Daylamani-Zad and Margarita P. O'Brien

The ability to communicate during online gaming is one that has become fundamental. Players could use voice, textual chat, pre-determined commands or a combination of these methods in order to command a team, follow an appointed leader or simply to socialise with friends. There is an abundance of reasons why a person will choose to utilise the conversational frameworks available, however, when considering a game where players must work together in order to reach a common goal, it is up for interpretation to determine which method works most efficiently. The aim of this work is to address this need through a game that utilises these three methods of communication in order to determine their efficiency. A combination of qualitative and quantitative methods was employed to formulate a well-rounded conclusion. Results indicated that a combination of voice and predetermined commands is the most efficient method of in-game communication in online, task-oriented games.

13:45 - 14:00

Measured and Perceived Physical Responses in Multidimensional Fitness Training through Exergames in Older adults

John Edison Muñoz, Afonso Gonçalves, Elvio Rubio Gouveia, Monica S. Camrirao and Sergi Bermúdez I Badia

Exergames have been used to increase physical activity levels to produce health benefits in older adults. However, only a small number of studies have quantified the physical activity levels produced by custom-made Exergames and their capacity to elicit recommended levels of exercise. This study investigates the effectiveness of custom-made Exergames, designed for multidimensional fitness training, in eliciting recommended levels of exercise. We rely on both objective (accelerometry) and subjective (perceived exertion) information collected in two different modalities of exercise, consisting of 40- minutes sessions: Exergaming and conventional training (Control). A between-subjects analysis was done involving two groups of active older adults (n=33). Participants in the Control- Between condition performed physical activity in conventional group fitness training, while the intervention group used individualized Exergaming as training modality. In addition, a sub-group of the Exergaming participants also performed a conventional training session (Control-Within), which enabled a within-subjects comparison. Results show that participants spent significantly more time in moderate-to-vigorous intensities during Exergaming, interestingly, perceiving significantly lower exertion levels. The between-subjects analysis only presented statistically significant differences for the perceived exertion scale. This study helps to unveil the impact of custom-made Exergames in physical activity levels during training when compared to conventional training for the older adult population.

14:00 - 14:15

A Multisensory 3D Environment as Intervention to Aid Reading in Dyslexia: A Proposed Framework

Martyn Broadhead, Damon Daylamani-Zad, Lachlan Mackinnon and Liz Bacon

Developmental Dyslexia (DD) is a common language-based learning difficulty which occurs across all cultures. Whilst various interventions are implemented to aid with reading difficulties, research suggests that phonics is still the most promising approach, yet the challenge in this approach has always been keeping pupils engaged and interested. Multisensory approaches have shown promise in keeping pupils engaged but they are time consuming and require high levels of teacher involvement. This paper suggests using 3D environments and gaming technology as a multisensory intervention to aid reading in Dyslexia. The paper proposes an initial framework and indicates the development and evaluation strategy for the framework.

14:15 - 14:30

Dynamic Systems Theory in Human Movement: Exploring Coordination Patterns by Angle-Angle Diagrams Using Kinect

John Edison Muñoz, Felipe Villada, Samuel Casanova, Maria Fernanda Montoya and Oscar Henao

Analyzing time series data using linear spatial/angular kinematics traditionally makes quantification of human movement using low-cost cameras such as the Kinect sensor. Through this conventional approach, interactions between body joints are difficult to analyze and coordination parameters remain hidden. Dynamic Systems Theory (DST) provides a non-linear framework to analyze human movement by representing intersegmental interactions in angle-angle diagrams. DST offers an accurate solution to study coordination in human movement, but it also requires expensive hardware and very specialized biomechanical software. The paper describes a methodological procedure to carry out DST analysis with motion data recorded from the Kinect sensor. Specifically, we address the issue to create and interpret angle-angle diagrams with an emphasis on exploring coordination patterns in motion capture (MoCap) signals. We introduced a method to facilitate the DST analysis and we applied it with two different use cases of human movement analysis in real scenarios: sports gesture study and motion analysis in physical rehabilitation interventions. Results showed that important coordination parameters could be deduced from the angle-angle diagrams improving the understanding of motion data when two joints have to be considered. Therefore, we demonstrated that DST analysis could be performed with inexpensive tools providing a promissory approach for coordination and motor synchronization analysis in novel serious games for health.

14:30 - 14:45

Towards Robust 3D Skeleton Tracking Using Data Fusion from Multiple Depth Sensors

Yuanjie Wu, Lei Gao, Simon Hoermann and Robert W. Lindeman

Real-time full-body tracking in VR is important for providing realistic experiences, especially for applications such as training, education, and social VR. The Microsoft Kinect v2 sensor can provide skeleton data for a user in real-time, however, due to occlusion issues and front/back ambiguity errors, one Kinect is not always reliable enough for the correct capture of 360-degree movements. In this paper, we present work to provide robust, real-time tracking using multiple Kinect v2 cameras An adaptive data fusion method is described that constructs a high-quality 3D skeleton which can be used to drive a VR avatar regardless of the user's orientation. We compare three different approaches to fusing the data from the three Kinects, and compare against ground truth using an OptiTrack system. A static pose and a dynamic movement were captured to compare errors of each joint using the three fusion algorithms. Our results show that an adaptive weighting adjustment fusion method for combining skeleton data from the three Kinects according to the current facing direction performed best in terms of joint error.

14:45 - 15:00

Image Warping using WebGL for a Smart Avatar Animating Body Weight Evolution

Georgios Bardis, Yannis Koumpouros, Nikolaos Sideris, Athanasios Voulodimos and Nikolaos Doulamis

Obesity comprises a common factor contributing to increased risk for a number of diseases. Research in the field has shown that a considerable percentage of obese population perceives their body figure to be significantly closer to a healthy body figure than it actually is. The current work attempts to employ image warping techniques, in combination with actual users' images, to offer a tangible view of the range of future or past stages of a body figure through the course of one or more alternative dietary/exercise plan(s) or the absence of such a plan. This functionality is offered as a module included in a web-based responsive application offering an animated view of the transformation according to input. Pure WebGL/JavaScript has been chosen as the platform to minimize footprint and maintain portability, eliminating the need for additional plugins for the visualization due to the inherent support of WebGL by most modern-day browsers.

Friday, September 7th

Lab Tours

from 17:00

The tours will start from the conference venue.

Human-Computer Interaction and Games Engineering

The Human-Computer Interaction group explores novel forms of interaction that focus on the user and the interaction experience, taking into account the requirements defined by the physical, cognitive, and perceptive skills of users. The Games Engineering group focusses on computer scientific challenges of realtime interactive systems but also pushes the envelope in procedural content generation.
Both groups are part of the JMU's Institute of Computer Science, thrive in an interdisciplinary research setting and are mainly responsible for programmes such as Human-Computer Interaction MSc, Human-Computer Systems BSc and Games Engineering BSc.

Media Educational and Educational Technology Lab (MEET)

meet

MEDIA EDUCATION AND
EDUCATIONAL TECHNOLOGY LAB

The school and media pedagogical laboratory for research and teaching at the University of Würzburg is dedicated to questions of teaching and learning with and via digital media in schools and teaching as well as in teacher training from an educational, technical, interdisciplinary and internationally comparative perspective.

Venues and Locations

Wednesday, September 5th
19:00
Reception: Wenzelsaal

The Wenzelsaal is the historical council hall in the west wing of the Würzburg town hall.

Address: Beim Grafeneckart, 97070 Würzburg

1. From the conference venue take **Bus 10** from "*Hubland/Mensa*" to "*Sanderring*"
2. Change to **Tram 5** at "*Sanderring*" and exit at "*Rathaus*"

Last Connection (to arrive in time): 18:35 from "*Hubland/Mensa*".

From the fountain look towards the town hall

Just before the sign "Rathaus" (town hall), turn right into the historic remembrance room ("Zerstörung Würzburgs …", Destruction in WWII)
In the remembrance room take the stairs to the right to reach the first floor and the Wenzelsaal

Thursday, September 6th

19:00

Conference Dinner: Backöfele

The Backöfele is a traditional restaurant in the centre of Würzburg close to town hall. It is known for its traditional franconian dishes and wine.

Address: Ursulinergasse 2, 97070 Würzburg

1. From the conference venue take **Bus 10** from "*Hubland/Mensa*" to "*Sanderring*"
2. Change to **Tram 5** at "*Sanderring*" and exit at "*Rathaus*"

Last Connection (to arrive in time): 18:35 from "*Hubland/Mensa*".

22:00

Guided Tour: Night watchman

Würzburger NACHTWÄCHTER

The Würzburg night watchman has become a real landmark and original of the city. For more than 20 years he has guided his guests through the evening alleys of Würzburg in 19th century costumes with halberd, tricorn, horn and lantern.

Meeting point: Fountain at town hall (Vierröhrenbrunnen)

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