2018 IEEE Games, Entertainment, Media Conference (GEM) Program

Time	Lobby	Lobby2	Theatre 1	Theatre 2	Theatre 3
Wednesday, August 15					
09:00-14:50		Edge-AI Workshop			
12:00-14:00	Registration	Edge-AI Workshop			
13:00-13:45	Registration	Edge-AI Workshop	Session 1.1: *X-Prize for AR/VR Workshop*		
13:05-13:30	Registration	Edge-AI Workshop	Session 1.1: *X-Prize for AR/VR Workshop*		
13:45-14:30	Registration	Edge-AI Workshop	Session 1.2: *GEM Synergies with IoT*		
14:30-14:50		Edge-AI Workshop	PE1: *Poster Elevator Pitches*		
14:50-15:30	P1: *Coffee, Posters, & Exhibits*	*VR Exhibits 1*			
15:30-15:45			*Opening Ceremony*		
15:45-16:30			*Keynote: Aljosa Smolic: Content Creation for AR, VR, and Free Viewpoint Video*		
16:30-17:15			*Keynote: Richard Bartle*		
17:30-19:30	*Welcome Party*				
Thursday, August 16					
08:50-09:40			*Keynote: Mia Consalvo: The Business and Culture of Live Streaming on Twitch: Evolving Paradigms*		
09:40-			Session 2.1: *Gaming for Health #1*	Session 2.2: *Narative &*	Session 2.3: *Game Design #1 -*

Time					
11:00			- Exergames	Storytelling in AR/VR	Game Design & AI Tools
11:00-11:30	Coffee Break				
11:30-12:50			Session 2.4: Accessibility & Rehabilitation Games #1	Session 2.5: GEM Design #1 VR Challenges & Opportunities	Session 2.6: Data Security & Privacy
12:50-13:00	Lunch				
13:00-13:50			Keynote: Kate Edwards: The Indiana Jones of the Digital Gaming World		
13:50-15:30			Session 2.7: Accessibility & Rehabilitation Games #2	Session 2.8: Beyond Augmented Reality #1	Session 2.9: Enabling Tech #1 for AR/VR - Sensing & Perception for Immersive Experiences
15:30-16:30			PE2: Poster Elevator Pitches	Session 2.10: Game Design #2 - Game Balance	
15:50-16:30	P2: Coffee, Posters & Exhibits	VR Exhibits 2			
16:30-17:15			Keynote: Lynn Fiellin		
17:15-18:30			PN1: Panel Session 1: Games and Data for Health	PN2: Panel Session 2: Immersive Education: Augmenting the Learning Experience	
19:00-21:00	Banquet				
Friday, August 17					
08:50-09:40			Keynote: Jacquelyn Morie		
09:40-11:00			Session 3.1: Game Design #3 - Procedural Content Generation #1	Session 3.2: Enabling Tech #2 for AR/VR - 3D Motion, Structure & Perspective	Session 3.3: Educational Games
11:00-11:20	C2: Coffee				

11:20-13:00			Session 3.4: *Deep Learning Techniques for GEM #1*	Session 3.5: *Learning with Games*	Session 3.6: *GEM Design #2 - User Considerations in Games Design*
13:00-13:15	L3: *Lunch*				
13:15-14:05			Keynote: *Martin Walsh: Mixed Reality - A Game Changer for Interactive Audio Technology*		
14:05-14:50			Keynote: *Brian Markwalter*		
14:50-15:10			PE3: *Poster Elevator Pitches*		
15:10-15:50	P3: *Coffee, Posters, Exhibits*	*VR Exhibits 3*	Session 3.9: *Theory & Philosophy of Gaming*	Session 3.8: *Beyond Augmented Reality #2*	
15:50-16:35			Keynote: *Kay Meseberg*		
16:35-17:35			PN3: *Panel Session 3: The Art of Immersion*		

Wednesday, August 15

Wednesday, August 15, 09:00 - 14:50

Edge-AI Workshop

Room: Lobby2

Wednesday, August 15, 12:00 - 14:00

Wednesday, August 15, 13:00 - 13:45

Session 1.1: X-Prize for AR/VR Workshop

Organised by Lizbeth Goodman
Room: Theatre 1

13:00 *WEAR Sustain - Sustainability Strategy Toolkit Development*
Berit Greinke (Berlin University of the Arts, Germany); Camille Baker (University for the Creative Arts, United Kingdom (Great Britain))

Wearable technologies, smart and electronic textiles have become a nascent market in recent years. These disruptive technologies open up new possibilities, notably for interdisciplinary collaborations between technology companies with artists/designers with technologists. In this paper we report on the work that has gone into the development of a sustainability strategy through analysing procedures and tools that have evolved in the work of the funded teams to embed sustainability into their practice. The Sustainability Strategy Toolkit (SST) is aimed at teams and start-ups that either already have sustainability integrated into their development but want to improve other aspects of their process, or as an incentive and how-to-guide for teams and start-ups who not yet implement sustainable practice. Case studies of teams are presented, showing how project teams negotiate and advance their goals of practical execution of sustainable aspects, and illustrating how design quality and readiness level are affected when utilising the interdisciplinary skill sets under the light of sustainable practice goals.

13:15 *WEAR Sustain Network: Ethical and Sustainable Technology Innovation in Wearables and Etextiles*

Nick Bryan-Kinns, Yongmeng Wu and Sankun Liu (Queen Mary University of London, United Kingdom (Great Britain)); Camille Baker (University for the Creative Arts, United Kingdom (Great Britain))

As the wearables and etextile markets mature it is time to consider this technological landscape in the bigger picture of a sustainable human-centred world. In this paper we report on the work of the WEAR Sustain project - a Europe wide catalyst for 46 projects in wearable technology design and development. Case studies of collaborations between artists and technologists in designing and realising sustainable and ethical wearable technologies are presented highlighting the opportunities and challenges for cross-disciplinary work in this sector and how they may potentially shift dominant techno-centric discourses on wearables and etextiles. Informed by the projects and network this presentation will demonstrate the WEAR outputs to date as an example of how the wearables and etextiles sectors can better leverage sustainable and ethical practices in their own supply-chain.

13:30 *WEAR Sustain: Selecting and Monitoring Innovation Teams Toward Ethical Practices and Sustainability*

Heritiana Renaud Ranaivoson (Imec, Belgium)

In WEAR Sustain, one Work Package is devoted to the selection and the follow-up of WEAR Sustain teams. Each selected team receives a fixed budget of EUR 50k to support and promote the prototyping of their product idea. This paper will present the work of the Monitoring Committee which tracks the progress of all funded projects. The Monitoring Committee's evaluation takes into account notably: • Whether the team has reached the set objectives, and if not, how they plan to remedy this situation • If the team is innovative, sustainable and ethical This IEEE GEM presentation will discuss the evaluation of these two WEAR-SUSTAIN processes across a number of case studies, presenting the outcomes and the challenges of guiding innovators toward new ways of working and thinking.

Wednesday, August 15, 13:05 - 13:30

L1: Box Lunch (only for Workshop registrants)

Room: Lobby

Wednesday, August 15, 13:45 - 14:30

Session 1.2: GEM Synnergies with IoT

Internet of Things (IoT) intersection with Games & Interactive Media technologies
Room: Theatre 1

Wednesday, August 15, 14:30 - 14:50

PE1: Poster Elevator Pitches

Room: Theatre 1
Chair: Sam Redfern (NUIG, Ireland)

Wednesday, August 15, 14:50 - 15:30

VR Exhibits 1

Room: Lobby2
Chair: Bryan Duggan (Dublin Institute of Technology, Ireland)

P1: Coffee, Posters, & Exhibits

Room: Lobby

Understanding User Engagement with Entertainment Media: A Case Study of the Twitter Behaviour of Game of Thrones (GoT) Fans

Alessia Antelmi (Università degli Studi di Salerno, Italy & Insight Centre for Data Analytics, Data Science Institute, Ireland); John Breslin and Karen Young (National University of Ireland, Galway, Ireland)

User Engagement in digital experiences is a fundamental concern for technology developers, educators, businesses and marketing agencies. This study contributes to our understanding of User Engagement at a behavioural level, through a quantitative analysis of HBO Game of Thrones fans' Twitter dataset.

The effect of gamification on intrinsic motivation for prioritisation

Tracey Cassells (IT Carlow, Ireland); Daire O'Broin (Institute of Technology Carlow, Ireland)

We are looking to aid students with setting priorities through gamification. We are running a pilot study with a generic prioritization task and a gamified prioritisation task to measure participants intrinsic motivation.

Does Mindfulness Affect Wellbeing and Physical Activity Levels of Pervasive Game Players? The Case of Ingress

Mehmet Kosa and Ahmet Uysal (Middle East Technical University, Turkey)

In this study, we have investigated if trait mindfulness is associated with physical activity levels and if mindful playing (in-game mindfulness) increases daily wellbeing of players when playing a pervasive game.

Design and Development of Augmented Reality (AR) Mobile Application for Malolos' Kameztizuhan (Malolos Heritage Town, Philippines)

Dennis dela Cruz (Bulacan State University & de la Salle University, Philippines); Jerico Sevilla, Joshua Wilfred San Gabriel, Angelica Joyce dela Cruz and Ella Joyce Caselis (Bulacan State University, Philippines)

United Nations (UN) Sustainable Development Goals (SDGs) 11 better known as Sustainable Cities and Communities advocates the preservation of world and individual nation's cultural and natural heritage. In line with this vision, the Philippines under the Republic Act No. 10066 or the National Cultural Heritage Act of 2009 has obliged the government to provide funding to implement projects supporting this cause. As a matter of fact, there are a lot of cultural heritage sites in the country that need maintenance and preservation; some initiatives include works done in the likes of Vigan in Ilocos Sur, Taal in Batangas, and Silay in Negros Occidental. But aside from these, a lot more sites are still left in the brink of oblivion. Malolos, for instance, has a residential district known as the Kameztisuhan still boasting of ancestral houses erected by the patriarchs of the town's influential families of the early 1900s. Through the passage of time, however, Malolos has lost its old illustriousness—some property owners practice adaptive reuse, with some which seem to be of no proper restoration guidelines. Thus, many structures were altered away from its original design, losing its historical feature and value at the same time. In addition, other property owners simply demolish old structures, probably finding maintenance more expensive or new structures more profitable. Currently, many of these old structures have no markers, so tourists and even locals can't identify their historicity or cultural significance. This led to the proposal of creating augmented reality (AR) mobile application where physical structures can be virtually simulated, viewed and controlled. This mobile application will help promote Filipino history and culture specifically on the historical and cultural value of Malolos' Kameztizuhan. The graphics of the application will be developed using SketchUp and will be imported into the Unity editor in order for them to be used for augmentation. The augmentation process will be handled by Vuforia that uses image recognition for target determination. Images of the present buildings captured from different angles will be processed through Vuforia's web-based Target Manager in order to convert these images into targets. The application has been tested and evaluated by visitors of Malolos' Kameztizuhan and employees of the Malolos City Tourism office. Criteria for the evaluation of the application to prove the application's effectiveness includes the following: user-friendliness, information accuracy, and user acceptance. It was accepted with enthusiasm and positive feedbacks due to its personalization features, navigation, and realism it offers to the users.

Design and Development of Virtual Laboratory: A Solution to the Problem of Laboratory Setup and Management of Pneumatic Courses in Bulacan State University College of Engineering

Dennis dela Cruz (Bulacan State University & de la Salle University, Philippines); Dion Michael Mendoza (Bulacan State University, Philippines)

Experiential learning has been proven to be of great benefit to students. In universities, such learning pedagogies are commonly accomplished through laboratory experiments. With the rapid rate of the development of new technologies, integration of industry practices, as well as simulation of industry environment, has never been more necessary. However, lack of facilities, equipment and laboratory space has been a major constraint of universities in the country. This is evident in Bulacan State University, which houses 5000 students in College of Engineering alone, distributed in eight (8) courses. Maintenance and management of laboratory equipment has also been problematic due to the vast number of lecturers and students that uses these facilities. In this paper, virtual reality is utilized in the development of laboratory simulations for pneumatics. Research and interview was conducted in order for the researchers to be familiar with the laboratory experiments performed in pneumatic courses. Rendering of the pneumatic components were done through Blender. Unity was used to develop the virtual reality environment. The researchers were able to create a simple experiment on a single-acting cylinder operated by a pneumatic switch. The experiment included the full use of the Vive gear, wherein the students are in a completely immersive 3D virtual reality environment, which included the use of controllers to simulate the actual environment. The software was run through Steam, and was tested by students from the university. The participants evaluated the software after simulation.

Wednesday, August 15, 15:30 - 15:45

Opening Ceremony

Room: Theatre 1

Wednesday, August 15, 15:45 - 16:30

Keynote: Aljosa Smolic: Content Creation for AR, VR, and Free Viewpoint Video

Augmented reality (AR) and virtual reality (VR) are among most important technology trends these days. Major industry players make huge investments, vibrant activity can be observed in the start-up scene and academia. The elements of the ecosystem seem mature enough for broad adoption and success. However, availability of compelling content can become a limiting factor. This talk will address this content gap for AR/VR, and present solutions developed in the V-SENSE team at TCD, i.e. 3D reconstruction of dynamic real world scenes and their interactive visualization in AR/VR.
Room: Theatre 1

Wednesday, August 15, 16:30 - 17:15

Keynote: Richard Bartle

Wednesday, August 15, 17:30 - 19:30

Welcome Party

Thursday, August 16

Thursday, August 16, 08:50 - 09:40

Keynote: Mia Consalvo: The Business and Culture of Live Streaming on Twitch: Evolving Paradigms

Mia Consalvo is the Canada Research Chair In Game Studies & Design at the University of Concordia in Montreal, Canada where she teaches courses on the theory and research of digital games and gameplay. Her primary research focus is on game studies, with particular interests in players and the culture of gameplay. She is author of several books: Cheating: Gaining Advantage in Videogames (MIT Press) and Players and Their Pets: Gaming Communities from Beta to Sunset.

Room: Theatre 1
Chair: Allan Fowler (Kennesaw State University, USA)

Thursday, August 16, 09:40 - 11:00

Session 2.1: Gaming for Health #1 - Exergames

Room: Theatre 1
Chair: Elena Bertozzi (Quinnipiac University, USA)

09:40 *Move well: design deficits in postural based exergames. What are we missing?*
Robin Tahmosybayat (Northumbria University, United Kingdom (Great Britain)); Katherine Baker, Alan Godfrey, Nick Caplan and Gill Barry (Northumbria University at Newcastle, Newcastle upon Tyne, United Kingdom (Great Britain))
One in three older adults in the UK over the age of sixty experience a fall. Exergaming (exercise-gaming) interventions are an alternate method of training postural control (PC) to prevent future falls, yet the movements trained in exergaming interventions are not fully understood with respect to established theory, the Systems Framework for Postural Control (SFPC). We systematically reviewed articles from six databases using search terms pertaining to older adults, PC, exergaming and falls. Full-text articles were screened for outcome measures, movement characteristics and were rated in conjunction with the SFPC. We assessed quality using the PEDro scale. Eighteen trials were included in the review with a mean PEDro score of 5.6 (1.5). A third of publications reported movement characteristics where commercial apparatus were used. Overall, 4.99 (1.27) of 9 possible areas of PC are currently trained with some not practical to train in an exergaming environment (sensory integration, reactive PC). Other areas of the SFPC are lacking due to restrictions in console apparatus and in game design due to a lack of movement ranges necessary to drive gameplay. Future game designs should consider the individual components of the SFPC and within each element the range of movement and speed of movement capabilities of an older adult. Designing for the needs of older adults and considering this framework may help train balance deficits within this population.

10:00 *An Objective Evaluation Method for Rehabilitation Exergames*
Reza Haghighi Osgouei (Imperial College London, United Kingdom (Great Britain)); Fernando Bello (Division of Surgery, Oncology, Reproductive Biology and Anaesthetics, United Kingdom (Great Britain)); David Soulsby (Acute Team Lead Paediatric Physiotherapist, United Kingdom (Great Britain))
The aim of this work is to objectively evaluate the performance of patients using a virtual rehabilitation system by tracking user's motion. We employ two algorithms, DTW and HMM, to compare the user's performance with that of the teacher's.

10:20 *Serious Games for Wrist Rehabilitation in Juvenile Idiopathic Arthritis*
Pier Luca Lanzi and Rocco Chiuri (Politecnico di Milano, Italy); Amalia Lopopolo, Michela Foà, Fabrizia Corona and Giovanni Filocamo (Ospedale Maggiore Policlinico, Milano, Italy)
Rehabilitation is a painful and tiring process involv- ing series of exercises that patients must repeat over a long period. Unfortunately, patients often grow bored, frustrated, and lose motivation making rehabilitation less effective. In the recent years video games have been widely used to implement rehabilitation protocols so as to make the process more entertaining, engaging and to keep patients motivated. In this paper, we present an integrated framework we developed for the wrist rehabilitation of patients affected by Juvenile Idiopathic Arthritis (JIA) following a therapeutic protocol at the Clinica Pediatrica G. e D. De Marchi. The framework comprised four video games and a set modules that let the therapists tune and control the exercises the games implemented, record all the patients actions, replay and analyze the sessions. We present the result of a preliminary validation we performed with six patients at the clinic under the supervision of the therapists. Overall, we received good feedback both from the young patients, who enjoyed performing known rehabilitation exercises using video games, and therapists who were satisfied with the framework and its potentials for engaging and motivating the patients.

10:40 *Effectiveness of Integral Kinesiology Feedback for Fitness-based Games*
Steve Mann and Hao Lu (University of Toronto, Canada); Ming-Chang Tsai (University of Toronto & Canadian Sports Institute Pacific, Canada); Maziar Hafezi, Azad Amin and Farhad Keramatimoezabad (University of Toronto, Canada)

Existing physical fitness systems are often based on kinesiology, i.e. physical kinematics, which considers distance and its derivatives: velocity, acceleration, jerk, jounce, etc.. In this paper, we examine the efficacy of using integral kinematics, such as absement, to evaluate performance during balance and stability related exercises including balance-based push-ups and pull-ups. An integral kinematics based game design framework with feedback mechanisms is also proposed as a way to provide motivation and improve fitness.

Session 2.2: Narative & Storytelling in AR/VR

Room: Theatre 2
Chair: Attracta Brennan (NUIGalway, Ireland)

09:40 *Sensory Seduction & Narrative Pull The Promise of Augmented Reality*
Nina Lyons, Matt Smith and Hugh McCabe (Institute of Technology Blanchardstown, Ireland)
The importance of visual inquiry and experimentation for new technologies, in particular Augmented Reality, to create engaging user experiences befitting the technology to create the sensory seduction and narrative pull that AR promises.

10:00 *Event-based Model of Narrative Structure for Games*
Bethany Dunfield, Anthony Whitehead and Ali Arya (Carleton University, Canada)
We propose a model for game narrative as the combination of story and its discourse, that can be used to both help write new game stories and evaluate existing ones. This model is based on scholarly models of narrative and narrative structuralism, with information about each narrative event and its position within the overall sequence of events.

10:20 *What Happened Here? An Immersive Virtual Story Narrated by Users*
Human Esmaeili (Centre for Research-Creation in Digital Media, Sunway University & SmartLab, Malaysia); Harold Thwaites (Centre for Research-Creation in Digital Media, Sunway University, Malaysia)
A large immersive scene was developed in order to perform a user study related to virtual storytelling. The processes involved and the results have been presented in this paper.

10:40 *Virtual Reality Games in Sensory Deprivation Tanks*
Steve Mann and Hao Lu (University of Toronto, Canada); Jeremy Warner (UC Berkeley, USA)
We present a new form of game-playing that takes place among one or more participants, each in a sensory deprivation tank, wearing a waterproof VR headset. Whereas conventional VR (Virtual Reality), AR (Augmented Reality), and Mediated ("XY") reality include an axis that spans from reality to virtuality (i.e. with reality as the origin), we build upon the newer multidimensional framework of multimediated reality that has nothingness at the origin (i.e. as facilitated by total sensory deprivation). This sets the stage for a novel class of games that facilitate the suspension of disbelief for the game's players. Floating in the tank creates a new context for a heightened sense of imaginality in the world of immersive/submersive reality. Specifically, our game involves mediation while singing a steady note, using phenomenologically augmented reality (e.g. seeing sound waves with an augmented reality lock-in amplifier). A VR game that uses the binaural beat brain entrainment technique in computer-mediated/networked sensory deprivation tanks is developed.

Session 2.3: Game Design #1 - Game Design & AI Tools

Room: Theatre 3
Chair: Allan Fowler (Kennesaw State University, USA)

09:40 *Procedurally Generating Game Level with Specified Difficulty*
Zong-Han Wu (National Dong Hwa University, Taiwan); Kevin Lai and Li-An Lin (National Taiwan University of Science and Technology, Taiwan); Ming-Han Huang (National Taiwan University, Taiwan); Wen-Kai Tai (National Taiwan University of Science and Techonology, Taiwan)
In this paper, we generate Pac-Man mazes with specified difficulty with respect to the number of intersections and elements given. We have divided the generated mazes into nine different difficulty levels, and the maze can nearly be generated in 40ms and it is playable! Therefore, our approach is practical and viable for real-time game applications.

10:00 *An Integrated Framework for AI Assisted Level Design in 2D Platformers*
Pier Luca Lanzi, Daniele Loiacono and Antonio Aramini (Politecnico di Milano, Italy)
The design of video game levels is a complex and critical task. Levels need to elicit fun and challenge while avoiding frustration at all costs. In this paper, we present a framework to assist designers in the creation of levels for 2D platformers. Our framework provides designers with a toolbox (i) to create 2D platformer levels, (ii) to estimate the difficulty and probability of success of single jump actions (the main mechanics of platformer games), and (iii) a set of metrics to evaluate the difficulty and probability of completion of entire levels. At the end, we present the results of a set of experiments we carried out with human players to validate the metrics included in our framework.

10:20 *CWU-Chess: An Adaptive Chess Program that Improves After Each Game*
Joseph Lemley (National University of Ireland, Galway, Ireland); Razvan Andonie, Ashur Odah, Pushpinder Heer, Jonathan Widger, Luke Magill, Berk Erkul and Kyle Littlefield (Central Washington University, USA)
Most approaches to computerized chess involve some variation of brute force, lookup tables, and alpha beta pruning to reduce the width of search trees. Given today's extensive computational power, this is reasonable approach to designing a program that will win games. Since this method is very different from (and much less efficient than) the way that humans play chess and other similar strategy games, it is desirable for those interested in artificial intelligence to investigate other approaches that rely less on brute force.

10:40 *Designing a Cooperative Mixed-Reality Game about Reconciliation*
Scott Swearingen and Kyoung Swearingen (The Ohio State University, USA)
'Wall Mounted Level' is a cooperative mixed-reality game that leverages multimodal interactions to support its narrative of 'reconciliation'. This paper discusses the design choices we made in creating the varying modes of player collaboration through both digital and physical engagement.

Thursday, August 16, 11:00 - 11:30

Coffee Break

Thursday, August 16, 11:30 - 12:50

Session 2.4: Accessibility & Rehabilitation Games #1

Room: Theatre 1
Chair: Allan Fowler (Kennesaw State University, USA)

11:30 *Collaborative Accessible Gameplay with One-Switch Interfaces*
Daniela Bulgarelli (Università della Valle d'Aosta, Italy); Fulvio Corno and Luigi De Russis (Politecnico di Torino, Italy)
Gaming, both traditional and electronic, is a key activity for children of all ages, enabling them to learn skills, socialize with friends and family, and entertain themselves. Unfortunately, children with disabilities encounter several accessibility barriers that prevent them to participate in mainstream games, unless some adaptations are made to the interfaces. This paper tackles the problem of enabling children with severe motor disabilities to participate in multiplayer games with their peers, thus providing opportunities for socialization and fun inside families or classrooms. We present a collaborative two-player puzzle game, based on several levels of labyrinths that need to be solved by moving the two players' characters. The characteristics of the game (such as the absence of time constraints, and the need of the players to coordinate their moves) were defined in a study group involving computer scientists, psychologists and speech therapists. The game was designed and implemented to be controllable with a single-switch interface, thanks to the GNomon interaction method. A preliminary evaluation has been conducted with 5 couples of able players (mostly children) who enjoyed the game and gave us useful insights.

11:50 *An accessible roller coaster simulator for touchscreen devices: an educational game for the visually impaired*
Laisa C. P. Costa (University of Sao Paulo & LSI-TEC, Brazil); Ana Grasielle Correa (Polytechnical School of University of Sao Paulo, Brazil); Lucas Dias and Erich Lotto (University of Sao Paulo, Brazil); Roseli Lopes (Polytechnical School of University of Sao Paulo, Brazil)
Electronic games are a great asset for Education. Currently, touchscreen devices, such as tablets and smartphones, have become an important game platform but few works explore the potential of this platform for accessible Education. This work investigates interaction strategies to develop an accessible roller coaster simulator to be used in Physics Education for people with and without visual impairments. This work was based on an existing Educational simulator that was adapted for touchscreen and accessibility. An application for mobile devices was developed and tested with a group of blindfolded. The project resulted in a roller coaster simulator that can be used by people with or without visual impairments with great potential to be used for educational purposes.

12:10 *Game for supporting dementia carers*
Noreena Liu and Gary Wills (University of Southampton, United Kingdom (Great Britain))
Dementia is one of the key public health challenges. The impact of dementia effects the whole family as they learn how to living with dementia. The purpose of this paper is to investigate games as an online platform to support carers of people with dementia.

12:30 *A low-Cost, Open-Source, BCI-VR Game Control Development Environment Prototype for Game based Neurorehabilitation*
Michael McMahon (NUI Galway, Ireland); Michael Schukat (Supervisor, Ireland)
In this paper we present an open-source BCI-VR Game Control Development Environment prototype to assist the investigation of gaming experiences which both incorporate the specific control features available through BCI and their potential for use in game-based neurorehabilitation.

Session 2.5: GEM Design #1 VR Challenges & Opportunities

Room: Theatre 2
Chair: Noirin Curran (Logitech, Ireland)

11:30 *VR Fact Sheet 2018 - An Overview of VR Movies & Games*
Kai Erenli (UAS BFI Vienna & Arx Anima, Austria)
According to the Gardner Hype Cycle VR has passed the "Trough of Disillusionment" and advanced to the "Slope of Enlightenment". Even though a fair amount of VR Titles has emerged, there has been no structured overview of the titles available, thus resulting in the fact that many Titles that demonstrate good practice are hidden behind a blurry curtain. Therefore, the research team has conducted an analysis of more then 300 VR Titles and developed a structured list that will aid giving an Overview of almost all VR-Titles currently available.

11:50 *Video Game User Experience: To VR, or Not to VR?*
Caglar Yildirim, Michael Carroll, Daniel Hufnal, Theodore Johnson and Sylvia Pericles (State University of New York at Oswego, USA)
Virtual reality (VR) has become an alternative medium for entertainment purposes, ranging from watching a movie to playing video games. Given the increasing use of VR for video gaming, the current study investigated whether VR gaming might affect the video gaming user experience. We compared three different gaming platforms, namely desktop computer, Oculus Rift, and HTC Vive, in terms of gaming user experience satisfaction. A total of 48 participants were randomly assigned to one of the three gaming platforms. Participants played a first-person shooter video game for ten minutes and provided game user experience satisfaction ratings. Results revealed no statistically significant differences across the three platforms in video game user experience satisfaction. Participants rated desktop gaming as significantly more usable when compared to the two VR conditions. These results indicate that VR gaming may not always be a better alternative to traditional desktop gaming in terms of video game user satisfaction.

12:10 *first.stage - Fast and easy previsualisation for creative industries*
Kai Erenli (UAS BFI Vienna & Arx Anima, Austria)

The goal of the H2020 EU-project first.stage is to research, design, develop, evaluate, and showcase natural user interfaces that improve previsualisation in film, animation, and the performing arts by speaking the language of the artist rather than that of a technician. It should further support distributed teamwork, as production teams are often spread over many places and only meet in person for short bursts. This criterion should be met by approaching the design with natural user interfaces (NUI) working with gesture, body, touch and speech. This presentation will focus on the results so far in the field of 3D Animation

12:30 *Using Traditional Keyboards in VR: SteamVR Developer Kit and Pilot Game User Study*

Sidney Bovet (Logitech, Switzerland); Aidan Kehoe (Logitech, Ireland); Katie Crowley (Trinity College Dublin, Ireland); Mario Gutierrez and Mathieu Meisser (Logitech, Switzerland); Noirin Curran and Damien O'Sullivan (Logitech, Ireland); Thomas Rouvinez (Logitech, Switzerland)
Following the mainstream release of VR, academic research has explored the challenges of text entry. This paper describes a commercial developer kit enabling use of physical keyboards (HTC Vive), and presents a study exploring initial use for typing in VR.

Session 2.6: Data Security & Privacy

Room: Theatre 3
Chair: Phil Ryan (University College Dublin & Ryan Immigration, Ireland)

11:30 *What are the biggest pitfalls for Providers & Developers of Consumer Electronics under the new EU General Data Protection Regulation*
Kai Erenli (UAS BFI Vienna & Arx Anima, Austria)
This presentation may aid manufacturers, publishers and operators of Consumer Electrics (e.g. Games, AR, VR, IoT, etc.) to develop and offer those Services and Goods while considering the new legislation of the EU General Data Protection Regulation no. 2016/679 (GDPR) which will be applicable in May 2018. The GDPR is considered a far-reaching legal instrument and will have a significant impact for all kinds of Consumer Electronic Providers, since fines, depending on the type of infringement, could go up to €20m or, in the case of undertakings, 4 percent of global turnover, whichever is higher. The presentation will focus on the Key-Points to help avoiding the biggest pitfalls and help to implement compliant procedures (Privacy by Design) as well as the learnings since 25th of May 2018. Furthermore, it should help to further start raising awareness towards the subject as (Personal) Data Mining has become a hot topic.

11:50 *Data Privacy, Transparency and the Data-Driven Transformation of Games to Services*
Ronan Fahy, Joris van Hoboken and Nico van Eijk (University of Amsterdam, The Netherlands)
This paper discusses the role of mobile app platforms in the data-driven business models of game app companies. The paper provides a new insight into this question, on the basis of an exploratory study of popular gaming apps and an analysis of the relationship between Apple and Google's mobile ecosystems and mobile apps in terms of the monetization of personal data. Additionally, the study draws upon filings made with the U.S. Securities and Exchange Commission (SEC), which shed light on the crucial role of personal data in the mobile app economy.

12:10 *A Privacy Framework for Games & Interactive Media*
Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland); Claudia Costache (National University of Ireland, Galway & Fotonation, Ireland)
Often considerations of privacy in the context of consumer IT devices are limited to the security of the data stored in the device. In this article a broader scope is introduced and defined in terms of different classes of privacy and the implications for games & interactive media (G&IM) devices and systems is discussed.

12:30 *Privacy and Inclusivity: A Proposal for an Inclusive Design Approach to GDPR Implementation in Augmented Reality Technologies*
Phil Ryan (University College Dublin & Ryan Immigration, Ireland)
Using the General Data Protection Regulation this paper looks at privacy policies importance in best practice for augmented reality usage/methods design. As these technologies become increasingly ubiquitous functionality creep makes the insights of inclusive design vital in protecting all users.

Thursday, August 16, 12:50 - 13:00

Lunch

Room: Lobby

Thursday, August 16, 13:00 - 13:50

Keynote: Kate Edwards: The Indiana Jones of the Digital Gaming World

Kate Edwards is the CEO and principal consultant of Geografy, a consultancy for content culturalization, the Executive Director of Take This, and is the former Executive Director of the International Game Developers Association (IGDA). In addition to being an outspoken advocate that serves in several advisory/board roles, she is a geographer, writer, and corporate strategist. Formerly as Microsoft's first Geopolitical Strategist she protected the company against political and cultural content risks across all products and locales. She has assisted many clients on a variety of geopolitical and cultural issues across many products and game franchises. Kate is also a columnist for Multi-Lingual Computing magazine. In October 2013, Fortune magazine named her as one of the "10 most powerful women" in the game industry and in December 2014 she was named by GamesIndustry.biz as one of their six People of the Year.
Room: Theatre 1

Thursday, August 16, 13:50 - 15:30

Session 2.7: Accessibility & Rehabilitation Games #2

Room: Theatre 1
Chair: Elena Bertozzi (Quinnipiac University, USA)

13:50 *Physical Literacy Promotion in Older Adults Using Active Video Gaming: A Sense of Presence and Attitudes towards Exercise*
Alexandre Monte Campelo and Larry Katz (Faculty of Kinesiology, University of Calgary, Calgary, Canada)
While active gaming may increase motivation to exercise, attitudes may vary depending upon the age group and sense of presence during the activity. The results suggest that there is a positive correlation between attitude towards exercise with the pre-disposition to feel immersed in active game-based exercise program.

14:10 *HAVE Experience: An Investigation into VR Empathy for Panic Disorder*
Vincent Russell, Rachel Barry and David Murphy (University College Cork, Ireland)
This paper explores a Virtual Reality (VR) system that emulates the symptoms of panic attacks with the aim of giving users a heightened awareness of those symptoms and theoretically a deeper empathy towards panic attack sufferers.

14:30 *Development and usability evaluation of an configurable educational game for the visually impaired*
Ana Grasielle Correa (Polytechnical School of University of Sao Paulo, Brazil); Laisa C. P. Costa (University of Sao Paulo & LSI-TEC, Brazil); Erich Lotto (University of Sao Paulo, Brazil); Roseli Lopes (Polytechnical School of University of Sao Paulo, Brazil)
Playing "electronic games" is a very popular freetime activity among children and adolescents. Electronic games have a prominent role in the culture of young people and have provided significant contributions when aligned to fields other than entertainment, such as education and health. Currently, touchscreen devices, such as tablets and smartphones, have become an important game platform. This work presents an educational configurable game designed for people with and without visual impairment. Its configurability allows multiple games instances with educational purposes. One instance of the game was implemented and usability tests with blind users were conducted. The project resulted in an engine that can produce games for people with or without visual impairment with great potential to be used for educational purposes.

14:50 *Words Worth Learning - Augmented Literacy Content for ADHD Students*
Jazheel Luna (University College Dublin, Ireland); Rita Treacy (WordsWorthLearning, Ireland); Tomonori Hasegawa, Abraham Campbell and Eleni Mangina (University College Dublin, Ireland)
3-9\% school-aged children in Ireland are estimated to be affected by ADHD (Attention Deficit Hyperactivity Disorder), according to HSE (Health Service Executive). Typical comorbid conditions include: anxiety disorder, oppositional defiant disorder, conduct disorder, depression, sleep problems, epilepsy, learning difficulties, etc. As such, unless early intervention properly takes place, performance of children with ADHD at school tends to be compromised (e.g. leaving school early and substance abuse etc.). The current work presents a preliminary investigation of creating 3D Learning Objects (3DLO) using Augmented Reality (AR), following the IEEE Learning Objects standards, to enhance an established online literacy programme, WordsWorthLearning (WWL). The methodology and experimentation of creating AR 3DLO is proposed, followed by a pilot evaluation, aiming to provide a foundation of a system that can support interactive educational content, service, assessment, and feedback for children with ADHD and their parents and teachers.

15:10 *The potential of young learners making games: An exploratory study*
Allan Fowler (Kennesaw State University, USA); Foaad Khosmood (Cal Poly, USA)
This paper presents the preliminary results of a Summer Game Development Camp to improve perceptions and persistence of under-represented minorities in computer science (CS). The focus of the camp was to measure changes in the perceptions of and persistence with CS in girls aged between 9 and 11 years old. The game development camp consisted of four days of practical lessons on programming and game development. The camp concluded with a game jam on the final day. The participants used a tile-based free game development platform from Microsoft (Kodu Game Lab) to learn some programming concepts through making computer games. The preliminary results indicate that the children's perceptions of and persistence in CS are influenced by practical programming lessons and making games. The authors observed that a camp exclusively for girls could foster their confidence and capability in learning to program.

Session 2.8: Beyond Augmented Reality #1

Room: Theatre 2
Chair: Bryan Duggan (Dublin Institute of Technology, Ireland)

13:50 *RobotQuest: A Robotic Game based on Projected Mixed Reality and Proximity Interaction*
Fabrizio Lamberti, Davide Calandra, Federica Bazzano, Filippo Gabriele Pratticò and Davide Destefanis (Politecnico di Torino, Italy)
The appearance of video games in modern society introduced a number of modifications in the recreational and socialization habits of both youths and adults. In particular, various studies have associated the excessive use of this media with health and social problems, being the ``classical'' video game often a sedentary and solitary activity. The purpose of this work is to propose a possible way to deal with the above issues, which consists in exploiting a platform for robotic gaming based on consumer hardware that is being developed with the aim to reintroduce the physical and social dimensions in digital games. The proposed solution encompasses a floor-projected Mixed Reality (MR) environment, an autonomous toy robot and a set of tangible interfaces created using proximity beacons, which are combined in a robotic game concept named RobotQuest that is meant to show how to favor an engaging room-scale interaction between players and real/virtual game elements.

14:10 *Creating AWE: Artistic and scientific practices in research-based design for exploring a profound immersive installation*
Denise Quesnel, Ekaterina Stepanova, Ivan Aguilar, Patrick Pennefather and Bernhard E. Riecke (Simon Fraser University, Canada)
The paper describes AWE (2018), an immersive mixed and virtual reality installation designed to elicit feelings of awe and wonder. Experiences of awe are found to prompt feelings of interconnectedness and an improvement to perceived well-being. To address the challenging prospect of designing for a specific emotional experience in a wellness application, we combined artistic and scientific practices through a research-based design process in order to identify awe-inspiring traits, generate a typology of awe, identify emotion validation techniques, and undertake iterative prototyping of the installation directly with participants. The resulting installation integrates a pre-VR mixed-reality experience to prime immersants for openness to the experience, followed by an immersive VR environment, and it uses a novel, custom interface for intuitive hands-free navigation. Our methods involve phenomenological interviews and physiological sensors to evaluate the evoked emotional experiences, which then inform design decisions to improve the system. Additionally, we integrate bio-responsive elements into the environment to further personalize the experience. Results suggest that AWE can elicit the target emotional experience of awe, prompt a transformative experience, and improve well-being in some participants.

14:30 *Experimental Game Interactions in a Cave Automatic Virtual Environment*
Karen Collins and Krzysztof Borowski (University of Waterloo, Canada)
In this paper, we describe the interaction design considerations for a series of experimental games using Unity3D and Microsoft Kinect that were created for a Cave Automatic Virtual Environment (CAVE), a 3-dimensional virtual semi-public space. Three games are described, but the focus is on the difficulties and solutions for designing in this space.

14:50 *Wearable Human Computer Interface for Control within Immersive VAMR Gaming Environments Using Data Glove and Hand Gestures*

Mariusz P. Wilk, Javier Torres-Sanchez and Salvatore Tedesco (Tyndall National Institute, Ireland); Brendan O'Flynn (Tyndall National Institute, Ireland)

We present a demonstrator system that shows how our wearable Virtual Reality (VR) Glove can be used with an off-the-shelf VR device, the RealWear HMT-1™ for control within immersive environments, using hand gesture recognition.

15:10 *Phenomenological Augmented Reality with the Sequential Wave Imprinting Machine (SWIM)*

Steve Mann (University of Toronto, Canada)

We present a computer user interface system that makes visible the otherwise invisible phenomenology around us, such as sound waves, radio waves, etc., to show phenomena such as interference patterns between multiple sources, so that these phenomena can be seen in such a way as by images generated from nature itself (rather than from computer graphics).

Session 2.9: Enabling Tech #1 for AR/VR - Sensing & Perception for Immersive Experiences

Room: Theatre 3
Chair: Liam Noonan (Limerick Institute of Technology, Ireland)

13:50 *A Review of Resolution Losses for AR/VR Foveated Imaging Applications*

Timothee Cognard (National University of Ireland Galway, Ireland); Alexander Goncharov and Nicholas Devaney (National University of Ireland - Galway, Ireland); Chris Dainty (Fotonation Ltd., Ireland); Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland)

Foveated imaging is of great interest for Augmented and Virtual Reality applications. This article reviews the factors limiting the resolution of the human eye off-axis, including cone density and eye lens, and discusses the challenges of foveated imaging for AR/VR.

14:10 *A 3D Hand Motion Capture Device with Haptic Feedback for Virtual Reality Applications*

Javier Torres-Sanchez and Salvatore Tedesco (Tyndall National Institute, Ireland); Brendan O'Flynn (Tyndall National Institute, Ireland)

In this paper, the challenges associated with the design of new generation hand motion capture devices for Virtual Reality (VR) applications are described. The need for developing a hand motion capture device with tactile feedback that integrates all the sensors and actuators associated with VR, while meeting the latency requirements is introduced. A detailed description of functional and non-functional specifications is also given. Finally, a comparison study with commercially available technology is provided highlighting that the proposed device compares favorably not only in terms of functional parameters, such as connectivity, integration of sensors and actuators, and latency, but also in terms of non-functional parameters, e.g., no need to wash, ambidextrous features and modularity

14:30 *"Painting with the eyes": Sensory perception flux rendered on the physical world*

Ryan Janzen, Sen Yang and Steve Mann (University of Toronto, Canada)

We introduce the concept of a "veillogram", a measurement of human perception over physical objects as if those objects were like photographic film. A time-integrated sensory field is tracked in 3D space. Human visual gaze on an object is rendered as a rich sensory array or heat map, rather than merely following the gaze of the eyes as one single point. Applications include entertainment and gaming, to measure the visual attention directed at parts of a screen or gaming console, integrated over time and accounting for time-integrated visual acuity.

14:50 *Rendering Vibrotactile Flow on Backside of the Head: Initial Study*

Minji Kim, Arsen Abdulali and Seokhee Jeon (Kyung Hee University, Korea)

In this article, we present an initial study of phantom sensation synthesis on the back side of the head. We proposed to render a vibrotactile flow between the temple, occipital, and parietal regions on the head using four actuators. Taking into account that humans perceive a vibrotactile stimulation on selected locations differently load, we normalized a perceived amplitude of respective actuators through psychophysical experiment. By pairwise actuating of adjoined actuators, we rendered ten patterns of vibrotactile flow in different directions and evaluated through additional psychophysical experiment. The results shown 86 percent of the identification accuracy where the user felt the continuous vibrotactile flow between active actuators.

15:10 *Using Multi-Sensor Voting for Resilience in VR Biofeedback Games*

Brian Flowers (Charles River Analytics, USA); Robert Tatoian, Ashley Witkowski, Natallia Katenka and Jean-Yves Hervé (University of Rhode Island, USA)

This paper describes a gesture controlled biofeedback virtual reality game designed to train participants to lower their physiological arousal. The game incorporates a sensor fusion design that leverages an independent voting paradigm for increased system resilience.

Thursday, August 16, 15:30 - 15:50

PE2: Poster Elevator Pitches

Room: Theatre 1

Thursday, August 16, 15:30 - 16:30

Session 2.10: Game Design #2 - Game Balance

Room: Theatre 2
Chair: James Broderick (National University of Ireland, Galway, Ireland)

15:30 *A Psychometric Detection System to Create Dynamic Psychosocial Relationships Between Non-Player Characters*

Xavier Caddle (The University of the West Indies Cave Hill Campus, Barbados); Curtis Gittens (University of the West Indies, Cave Hill, Barbados); Michael Katchabaw (University of Western Ontario, Canada)

We present PSYCH, a framework that enables game programmers to extract psychometrics (emotions, for example) from the player and transmit them to game NPCs. We demonstrate the capabilities of the framework by integrating it with a pre-existing psycho-social framework so that a game programmer can use PSYCH to generate different behaviors in the framework's NPCs by having the player speak simple phrases to them.

15:50 *Lessons from Testing an Evolutionary Automated Game Balancer in Industry*

Mihail Morosan and Riccardo Poli (University of Essex, United Kingdom (Great Britain))

The work presented takes a game balancing algorithm and, in cooperation with a commercial games studio, defines a specification language and tests its applicability in a real world scenario. Results indicate both great potential of the research area in generals.

16:10 *Dynamically Adaptive Simulation Based on Expertise and Cognitive Load*

Dirk Rodenburg, Paul Hungler, Ali Etemad, Dan Howes, Adam Szulewski and Jim McLellan (Queen's University, Canada)

Dynamically assessing and responding to cognitive load in simulated environments is a powerful new tool. By combining dynamic cognitive load assessment with data analytics and artificial intelligence (AI), we create a new partnership between the learner and the learning environment.

Thursday, August 16, 15:50 - 16:30

VR Exhibits 2

Room: Lobby2
Chair: Bryan Duggan (Dublin Institute of Technology, Ireland)

15:50 *Home Entertainment with connected lighting*

Dzmitry Aliakseyeu and Jon Mason (Philips Lighting, The Netherlands)

Commercial connected lighting systems have advanced in the last 5 years such that anyone's home can become responsive and semi-intelligent. Thus far, the main applications of this smart lighting have been practical and utilitarian, like security lighting, home automation, and ease of control. However, from the professional domain, we know that lighting can also be used for more hedonic applications. There is entertainment and concert lighting, media facades, interactive art installations and so on. At Philips Lighting we believe that lighting will become a natural element for all in-home entertainment. In this industry presentation we will share our journey from understanding the role home lighting can play with entertainment media, to implementing and evaluating different applications prior to market introduction. The topic of the presentation was discussed with Peter Corcoran

P2: Coffee, Posters & Exhibits

Room: Lobby

Review of Player Personality Classifications to inform Game Design

Philip Bourke (Institute of Technology Carlow, Ireland); David Murphy and John Mullane (University College Cork, Ireland); Kevin Marshall and Stephen Howell (Microsoft Ireland, Ireland)

The objective of this study is to identify classifications for players, identify contexts that improve player sensation thereby deepening gameplay immersion both vicarious and visceral immersion.

User-Centered Design to a Digital Cultural Heritage installation based on Afro-Peruvian musical legacy

Andrea I. Sotelo Guadalupe (King's College London)

The objective was to design a Digital Cultural Heritage (DCH) installation that would provide the National Afroperuvian Museum an innovative way to capture the young audience's attention by providing an immersive experience through the manipulation of tangible transdigital Afroperuvian instruments.

GazeVisual - A Graphical Software Tool for Performance Evaluation of Eye Gaze Estimation Systems

Anuradha Kar (National University of Ireland Galway, Ireland); Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland)

The concept of an open source software developed for all round performance evaluation of gaze tracking systems and applications is presented. The capabilities of this software towards quantitative, statistical and visual analysis of eye gaze data are discussed. Potential utilities of this software are towards understanding a gaze tracker's behavior, gaze data quality, and improving usability of gaze based applications that are currently very popular in AR/VR, gaming and multimedia domains.

GDGSE: Game Development with Global Software Engineering

Alia Fatima (National University of Science and Technology, Pakistan)

The management models and skilled workforce required for game development is different from those of traditional software development. Multidisciplinary nature of the game development process requires people with different skills and incurs higher cost as compared to traditional software engineering. Global software engineering (GSE), which involves the development of top level software projects by different teams located around the globe, can be used for game development. The core benefits offered by GSE include reduced costs and increased workforce skillset through coordination of people with diverse expertise. However, such integration of widely distributed teams requires efficient communication and coordination which is a challenging task. In this paper, we propose a method of making the game development process more cost effective. We combine the concept of game development methodology with GSE into a new global game development methodology. Furthermore, successful team coordination will be achieved by proper documentation and prototyping in the pre-production phase of our methodology. This combination will provide a means of communicating functionality and interaction as a single package to the team.

MOOC for AR VR Training: Obstacles, Challenges and Usability

Zi Siang See (University of Newcastle, Malaysia & School of Creative Industries, Australia); Xia Sheng Lee (University of Reading Malaysia, Malaysia); Adam Brimo (OpenLearning, Australia); Harold Thwaites (Sunway University, Malaysia); Lizbeth Goodman (University College Dublin, Ireland)

This paper provides a case study of massive open online course (MOOC) for augmented reality (AR) and virtual reality (VR). The research studies the obstacles, challenges and usability issues entailed in the management of a novel MOOC for AR and VR training. This case study investigation outlines an overview of the potential obstacles and issues with the intention of how MOOC addresses best practices and the fundamental requirements of AR and VR training.

Coming Home: Art and the Great Hunger: A Case Study in Game Development for an Exhibition
Gregory Garvey and Jonah Warren (Quinnipiac University, USA)

This paper covers the process of initial ideation and brainstorming to the completion of a new game about the Irish famine (The Great Hunger). Implemented as a single player turn-based game it is an interdisciplinary collaboration between Ireland's Great Hunger Museum at Quinnipiac University, PreviewLabs of New Haven/Belgium with contributions by students and faculty from the Game Design & Development Program at Quinnipiac. Targeting children aged 10 to 13, the game will accompany the Museum's 2018 traveling exhibition, Coming Home: Art and the Great Hunger, touring Ireland at Dublin Castle, Skibbereen's West Cork Arts Centre, and Cultúrlann Uí Chanáin in Derry.

Thursday, August 16, 16:30 - 17:15

Keynote: Lynn Fiellin

Lynn E. Fiellin, M.D. is an Associate Professor of Medicine at the Yale School of Medicine and at the Yale Child Study Center. She is also Founder and Director of the play2PREVENT (p2P) Lab at Yale (http://play2prevent.org/) and the newly formed Yale Center for Health & Learning Games (http://games.yale.edu/).
Room: Theatre 1

Thursday, August 16, 17:15 - 18:30

PN1: Panel Session 1: Games and Data for Health

The commercial games industry uses in-game data generated by players for a wide variety of purposes. Serious/applied games are only beginning to explore leveraging this data to improve player experience, understand player motivation, and better focus initiatives that seek to modify player behavior to improve health. Our panelists all have experience designing, building and deploying pro-health games and they will discuss the possibilities and perils of doing so.
Room: Theatre 1
Chair: Bryan Duggan (Dublin Institute of Technology, Ireland)

PN2: Panel Session 2: Immersive Education: Augmenting the Learning Experience

Educators and students are seeking an ever-expanding immersive landscape, where students engage with teachers and each other through a wide spectrum of interactive resources. In this educational reality, VR has a definitive place of value. Our panellists all have experience designing, building and deploying VR/AR applications for education and they will discuss the possibilities and try to predict the future of immersive education.
Room: Theatre 2
Chair: Eleni Mangina (University College Dublin, Ireland)

Thursday, August 16, 19:00 - 21:00

Banquet

Friday, August 17

Friday, August 17, 08:50 - 09:40

Keynote: Jacquelyn Morie

Jacquelyn Ford Morie is an artist, scientist and educator working in the areas of immersive worlds, games and social networks. Until 2013 she was a Senior Research Scientist at the Institute for Creative Technologies. In 2013 she started a spin-off company called All These Worlds, to take her work in virtual worlds and avatars to a broader audience. Jacquelyn was formally trained as an artist and medical illustrator but ultimately decided to pursue fine art. Her Bachelor's degree in Fine Art was awarded cum laude by Florida Atlantic University in 1981. She next received a Master's degree in Fine Art from the University of Florida in 1984, studying with noted photographer Jerry Uelsmann. She

studied computer graphics at the University of Florida, under Professor John Staudhammer and received her Masters in Computer Science from University of Florida in 1988. Morie received her PhD from SmartLab at the University of East London in 2008 in immersive environments

Room: Theatre 1

Friday, August 17, 09:40 - 11:00

Session 3.1: Game Design #3 - Procedural Content Generation #1

Room: Theatre 1
Chair: Sam Redfern (NUIG, Ireland)

09:40 *Digital Scene Augmentation Techniques for Generating Photo-realistic Virtual Crowds*
Kevin Lee, Anton Shmatov and Jonathan Byrne (Intel Ireland, Ireland); David Moloney (Movidius, Ireland)
Crowd estimation has a wide range of applications especially in relation to computer vision, robotics and security surveillance technology. New computer vision techniques and deep learning technology have enabled large scale crowd estimation but advances in these techniques have been hindered by the lack of high quality, annotated and publicly available datasets. Although there has been several attempts to compile crowd datasets in the past, collecting and labelling the data is a tedious and labour intensive task. New privacy legislations also make it difficult to release real world footage to the public. In this paper, we present a novel method to generate photo-realistic scalable labelled synthetic crowds for the purpose of accelerating the state-of-the-art in crowd understanding techniques. We generate human models on scene reconstructed environments. The environments are created with footage captured by aerial drone surveys. The crowds are then composited with the original images to generate photo-realistic data. This dataset contains 500 high resolution images with over 230,000 annotations and is intended to be publicly available to further advance research in crowd understanding.

10:00 *The Omni Framework: A Destiny-driven Solution to Dynamic Quest Generation in Games*
Imran Khaliq (Media Design School, New Zealand); Zachary Watson (Media Design School, Auckland, New Zealand)
Video games have had the capability to generate dynamic quests for years. Such quests are generally generated from tables of values or randomly assigning properties without properly regarding player progress, situation, or preference. This paper proposes a framework, called Omni Framework, for creating quests that are dynamic and contextually linked by incorporating player statistics and play-style. The core of this framework is the Destiny Concept - the idea that a player's `destiny' can be uniquely `discovered' and followed throughout the game, rather than scripted.

10:20 *Synthesizing Game Audio Using Deep Neural Networks*
Aoife McDonagh (National University of Ireland, Galway & Xperi, Ireland); Joseph Lemley (National University of Ireland, Galway, Ireland); Ryan J. Cassidy (DTS, Inc., USA); Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland)
High quality audio plays an important role in gaming, contributing to player immersion during gameplay. Creating audio content which matches overall theme and aesthetic is essential, such that players can become fully engrossed in a game environment. Sound effects must also fit well with visual elements of a game so as not to break player immersion. Producing suitable, unique sound effects requires the use of a wide range of audio processing techniques. In this paper we examine a method of generating in-game audio using Generative Adversarial Networks, and compare results to traditional methods of synthesizing and augmenting audio.

10:40 *DOOM Level Generation using Generative Adversarial Networks*
Edoardo Giacomello, Pier Luca Lanzi and Daniele Loiacono (Politecnico di Milano, Italy)
We applied Generative Adversarial Networks (GANs) to learn a model of DOOM levels from human-designed content. Initially, we analyzed the levels and extracted several topological features. Then, for each level, we extracted a set of images identifying the occupied area, the height map, the walls, and the position of game objects. We trained two GANs: one using plain level images, one using both the images and some of the features extracted during the preliminary analysis. We used the two networks to generate new levels and compared the results to assess whether the network trained using also the topological features could generate levels more similar to human-designed ones. Our results show that GANs can capture intrinsic structure of DOOM levels and appears to be a promising approach to level generation in first person shooter games.

Session 3.2: Enabling Tech #2 for AR/VR - 3D Motion, Structure & Perspective

Room: Theatre 2
Chair: Liam Noonan (Limerick Institute of Technology, Ireland)

09:40 *Investigating the use of Suboptimal Hashing Functions*
Léonie Buckley (Movidius, Intel & Collinstown Industrial Park, Leixlip, Kildare, Ireland); Jonathan Byrne (Intel Ireland, Ireland)
For the purpose of volumetric data, hashing acts to map multi-dimensional space into the one-dimensional space. Traditional methods used to hash 3D volumetric data utilise large prime numbers in an attempt to achieve well-distributed hash addresses to minimise addressing collisions. These methods generate hashing addressing through randomisation. However, it has been shown that when considering dynamic data, a low addressing collision rate cannot be guaranteed through this randomising technique. In this paper, a spatial hashing implementation is investigated, and whether varying performance parameters can be improved upon through the use of DECO Hashing. DECO leverages the inherent structure present in 3D data, which exists in the sense that each coordinate in 3D space is already unique. An open source version of Chisel is investigated - OpenChisel - and it is determined whether the algorithm can be improved upon through replacing the existing hashing function with DECO Hashing.

10:00 *Enhancement layer inter frame coding for 3D dynamic point clouds*
Shishir Subramanyam (Centrum Wiskunde & Informatica & TU Delft, The Netherlands); Pablo Cesar (CWI, The Netherlands)
Point clouds are an important format for 3D reconstructions used in AR and VR. Point clouds are simple, versatile and unorganised but they are also challenging to compress. We propose a point cloud codec with enhancement layer inter prediction.

10:20 *Evaluating Embodied Navigation in Virtual Reality Environments*
Johannes Deyoung (Yale University, USA); Stephanie Riggs (Sunchaser Entertainment, USA); Justin Berry, Lance Chantiles-Wertz and Jack Wesson (Yale University, USA)
Comparing existing modes of Virtual Reality navigation (game controller based) with a mode of controller-less embodied navigation.

10:40 *Using Perspective to Reduce Stimulus Response in Virtual Reality*

Brian Flowers (Charles River Analytics, USA); Robert Tatoian, Natallia Katenka and Jean-Yves Hervé (University of Rhode Island, USA)

The experiment presented in this paper studies the usage of perspective as a method to modify the magnitude of the impact that participants feel towards stimuli within a Virtual Environment.

Session 3.3: Educational Games

Room: Theatre 3

Chair: Eleni Mangina (University College Dublin, Ireland)

09:40 *No Limit: A Down Syndrome Children Educational Game*

Wafaa Shalash (King Abdul Aziz University, Saudi Arabia)

Down syndrome children suffer from many problems could be categorized as physical disabilities and intellectual disabilities. Intellectual disabilities include a delay in development, learning difficulty, difficulty in developing language skills and speaking clearly. The proposed work suggested a method to develop their physical and intellectual abilities through an interactive game. This game designed and developed as a result of collaborative work between game developers and therapists to find the best scenario to improve down syndromes children both motor and cognitive skills. The children were involved during all of the development stages. The proposed game was developed using Unity 3D as a platform and Kinect 360 camera to detect child reaction. The finally developed game was tested on our target users and shows a promising result.

10:00 *Robo^3: a puzzle game to learn coding*

Daniele Loiacono (Politecnico di Milano); Filippo Agalbato (Politecnico di Milano, Italy)

We introduce Robo^3, a simple puzzle game that can support the teaching basic coding skills. The game is inspired to well known coding games, such as LightBot and CargoBot, where the player controls a robot by creating a small program. Players are not expected to have any previous coding experience, as programs are simply a sequence of actions the robot can perform. Teachers can design their own puzzles that focus on different programming concepts and patterns they want their students to learn and practice. All the actions performed by the students in game are recorded, allowing the teachers to monitor either the progresses criticalities during the class.

10:20 *Scenic Spheres - An AR/VR Educational Game*

Samuel Bryan, Abraham Campbell and Eleni Mangina (University College Dublin, Ireland)

Educational systems are constantly evolving to keep up with the constant stream of technological advances and to ensure that teaching methods are relevant and interesting to a group of students who have grown up in a digital world. Advances in Augmented and Virtual Reality (AR/VR) in particular, enable us to offer learning experiences that would not have previously been available and to offer students the opportunity to explore places that they would not usually be able to go. This paper introduces Scenic Spheres, an AR/VR reality educational tool created using the principles of gamification, via the Unity game development engine. Scenic Spheres will allow students to "travel" to different countries around the world using Google Street View imagery. The students are able to explore these locations, while learning facts and answering questions along the way. Harnessing the capabilities of AR/VR technologies, Scenic Spheres intends to provide an immersive experience for students that will ultimately enhance their learning and engage and motivate them to learn more about the world around them.

10:40 *Music Blocks: Audio-augmented block games for play-based cognitive assessment*

David Miranda and Kiju Lee (Case Western Reserve University, USA)

Music Blocks are audio and musical games that use sensor-embedded cube blocks designed for play-based cognitive and motor skill assessments. Music Blocks allow the user to customize the sensory feedback, such as audio, visual, tactile, or a combination of any two or more, within the game design. Three Music Games were designed for preliminary evaluation: Direction Blocks, MineSweeper, and Password Blocks. New algorithms to support real-time game administration and data collection for these three games were also developed. For preliminary evaluation of technical function and usability, the games were tested on a small group of 17 participants. As a baseline cognitive assessment, three subtests of the Wechsler Adult Intelligence Test Fourth Edition (WAIS-IV: Block Design, Digit Span, and Matrix Reasoning) were also administered to all participants. Preliminary results showed that audio and visual stimuli have equal participant performance in the Password Game (50%/50%), and audio portrays information well in tangible games (e.g. MineSweeper No-Visual Completion Rate: 64.7%). Individual Music Blocks games correlated with the WAIS-IV subtests.

Friday, August 17, 11:00 - 11:20

C2: Coffee

Room: Lobby

Friday, August 17, 11:20 - 13:00

Session 3.4: Deep Learning Techniques for GEM #1

Room: Theatre 1

11:20 *Automatic Prediction of Cybersickness for Virtual Reality Games*

Weina Jin, Jianyu Fan, Diane Gromala and Philippe Pasquier (Simon Fraser University, Canada)

Cybersickness, which is also called Virtual Reality (VR) sickness, poses a significant challenge to the VR user experience. Previous work demonstrated the viability of predicting cybersickness for VR 360° videos. Is it possible to automatically predict the level of cybersickness for interactive VR games? In this paper, we present a machine learning approach to automatically predict the level of cybersickness for VR games. First, we proposed a ranking-rating (RR) measure to collect the ground-truth annotations for cybersickness. We then verified the RR scores by comparing them with the Simulator Sickness Questionnaire (SSQ) scores. Next, we extracted features from heterogeneous data sources including the VR visual input, the head movement, and the individual characteristics. Finally, we built three machine learning models and evaluated their performances: the Convolutional Neural Network (CNN) trained from scratch, the Long Short-Term Memory Recurrent Neural Networks (LSTM-RNN) trained from scratch, and the Support Vector Regression (SVR). The results indicated that the best performance of predicting cybersickness was obtained by the LSTM-RNN, providing a viable solution for automatically cybersickness prediction for interactive VR games.

11:40 *Neuro-Evolution and Reproducibility: a Case Study*

Michael Weeks, Andre Randall and Vib Patel (Georgia State University, USA)

We have a game with a non-playing character controlled by a neural network, where the weight set determines the character's next move. The weight sets were evolved using neuro-evolution, where a genetic algorithm alters the weights of the neural network. Previously, we created neural network data to provide a population from which to select "parents," then use cross-over and mutation to create a new set of weights ("offspring"), and evaluate them to find relative rankings. After thousands of iterations, sets of weights evolved to allow the NN-controlled character to win easily. Are the results robust, that is, how sensitive is the neuro-evolution solution to initial conditions? In this paper, we test our previous results to see how well the neural network weight sets perform under different starting conditions.

12:00 *Eye Tracking in Augmented Spaces: a Deep Learning Approach*

Joseph Lemley (National University of Ireland, Galway, Ireland); Anuradha Kar (National University of Ireland Galway, Ireland); Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland)

The use of deep learning for estimating eye gaze in augmented spaces is investigated in this work. There are two primary ways of interacting with augmented spaces. The first involves the use of AR/VR systems; the second involves devices that respond to the user's gaze directly. This domain can overlap with AR/VR environments but is not exclusive to them and contains its own unique set of research and engineering problems. Deep learning methods for eye tracking that are capable of performing with minimal power consumption are investigated for both problems.

12:20 *A Deep Learning approach to Segmentation of Distorted Iris regions in Head-Mounted Displays*

Viktor Varkarakis (National University of Ireland Galway, Ireland); Shabab Bazrafkan (NUI Galway, Ireland); Peter Corcoran (National University of Ireland, Galway & National University of Ireland Galway, Ireland)

In this paper the problem of segmentation for distorted iris images as represented by a head-mount display is studied by utilising deep neural networks.

12:40 *Optimized Facial Emotion Recognition Technique for Assessing User Experience*

Xiao Liu and Kiju Lee (Case Western Reserve University, USA)

This paper presents a novel optimization technique in image processing for emotion recognition based on facial expression. The method combines two pre-processing filters (prefilters),i.e., brightness and contract filter and edge extraction filter, with Convolutional Neural Network (CNN) based learning and Support Vector Machine (SVM) for emotion classification. Instead of using an arbitrarily selected set of parameters used for the pre-filters, the presented algorithm automatically tunes the parameters by analyzing learning outcomes from CNN and selecting the parameter set which produces the best result. This method was evaluated for accuracy and efficiency. The result showed 98.19% emotion recognition accuracy using CNN with 3,500 epochs for given 3,589 face images. With demonstrated efficiency and accuracy, this method shows great potential for embedded human computer applications, in particular for assessing user experience and preference in games and media.

Session 3.5: Learning with Games

Room: Theatre 2
Chair: Eleni Mangina (University College Dublin, Ireland)

11:20 *Improving Learning Experience by Employing DASH-based Mulsemedia Delivery*

Ting Bi (Dublin City University, Ireland); Fabio Silva (Dublin City University - Ireland & IEEE STUDENT MEMBER (93162865), Ireland); Gheorghita Ghinea (Brunel University, United Kingdom (Great Britain)); Gabriel-Miro Muntean (Dublin City University, Ireland)

This paper describes the experimental deployment of a DASH-based Multi-Sensory Media Delivery System to support multi-sensorial media-enhanced learning. Multi-sensorial media combines multimedia components (video and audio) and emerging technologies targeting other human senses (e.g. touch \& haptics, smell and taste).

11:40 *Designing a multisensory social serious-game for primary school mathematics learning*

Erica Volta (University of Genoa, Italy); Paolo Alborno (University of Genova, Italy); Monica Gori (Italian Institute of Technology, Italy); Gualtiero Volpe (University of Genova, Italy)

Psychophysics and developmental psychology results show that children have a preferential sensory channel to learn specific concepts, highlighting the need of a multisensory approach to education. Despite such a potential for a positive impact, in education technology research multisensory learning has been often penalised and limited by design choices. In this work, we present the interactive design process that led us to define an implementable prototype of serious-game aimed at teaching children a precise mathematical concept: \textit{angles}. The game is based on the interaction between different sensory modalities, in particular: movement, vision, and sound.

12:00 *A Gamified System for Learning Mandarin Chinese as a Second Language*

Sam Redfern (NUIG, Ireland); Richard McCurry (Newby Chinese Ltd, Ireland)

We discuss the use of gamification in second-language learning systems, and explore various types of gamification elements. We introduce Newby Chinese - a gamified system for learning Mandarin Chinese, whose core concepts include audio icons, mnemonics, minigames and overarching narrative.

12:20 *"Woodlands" - a virtual reality serious game supporting learning of practical road safety skills*

Krzysztof Szczurowski and Matt Smith (Institute of Technology Blanchardstown, Ireland)

This paper describes the design and development process of a computer-supported learning system that attempts to address psycho-motor skills involved in crossing a road safely, changing learners' attitude towards road safety best practices, and enabling independent practice of transferable skills

12:40 *Using a Game Engine to Simulate Critical Incidents and Data Collection by Autonomous Drones*

David Smyth, Frank Glavin and Michael Madden (National University of Ireland, Galway, Ireland)

Using a game engine, we have developed a virtual environment which models important aspects of critical incident scenarios. We focused on modelling phenomena relating to the identification and gathering of key forensic evidence, in order to develop and test a system which can handle chemical, biological, radiological/nuclear or explosive (CBRNe) events autonomously. This allows us to build and validate AI-based technologies, which can be trained and tested in our custom virtual environment before being deployed in actual real-world scenarios. We have used our virtual scenario to rapidly prototype a system which can use simulated Remote Aerial Vehicles (RAVs) to gather images from the environment for the purpose of mapping. Our environment provides us with an effective medium through which we can develop and test various AI methodologies for critical incident scene assessment, in a safe and controlled manner.

Session 3.6: GEM Design #2 - User Considerations in Games Design

Room: Theatre 3

Chair: Noirin Curran (Logitech, Ireland)

11:20 *Robotic Gaming and User Interaction: Impact of Autonomous Behaviors and Emotional Features*
Fabrizio Lamberti, Filippo Gabriele Pratticò, Davide Calandra, Giovanni Piumatti, Federica Bazzano and Thiago Villani (Politecnico di Torino, Italy)
This paper aims to investigate the impact associated with the introduction of emotional features and autonomous behaviors in robotic games leveraging drones. To this purpose, a game named \emph{Protoman Revenge} incorporating the above elements is implemented by following known guidelines regarding game design, in general, and so-called Physically Interactive Robotic Games (PIRGs), in particular. A user study is devised to evaluate how the above traits affect the individual's experience and engagement. Obtained results could be possibly exploited to orient further research in the field of robotic gaming and other applications (not necessarily involving drones) w.r.t. to the perception of robot's autonomy and of emotional encoding strategies.

11:40 *Analyzing User Behavior Data in a Mobile Tennis Game*
Maxim Mozgovoy (University of Aizu, Japan)
The users of online multiplayer games generate vast amount of data that can be later used to fine-tune the game and optimize user experience. The present paper is dedicated to the analysis of user behavior in a mobile tennis game World of Tennis: Roaring '20s. It implements a pseudo-multiplayer game mode by introducing AI-controlled opponents trained on real user data and mimicking human behavior. We analyze user recordings to ensure that they exhibit a variety of consistent play styles that can be learned by the AI system to ensure challenging and lasting entertainment for the players.

12:00 *A Case Study of User Experience on Hand-Gesture Video Games*
Chao Peng (University of Alabama in Huntsville, USA); Jeffrey Hansberger (Army Research Lab, USA); Vaidyanath Areyur Shanthakumar, Sarah Meacham, Victoria Blakley and Lizhou Cao (University of Alabama in Huntsville, USA)
As motion capture systems become reliable and affordable, hand gestures can be identified in real-time and used in video games as alternative game controls. However, there is not enough studies about user experience using gesture input modality for games. In this work, we perform a case study of hand-gesture video games. We try to answer the question "Do players have a delightful experience when they interact with the game using hand gestures?". We map intuitive hand gestures to commands and use them to control the movement of game characters. We perform a user study based on User Experience Questionnaires (UEQ). In comparing to all interactive products registered in UEQ study database, our gesture control interface scores in the top 1% range showing that gesture-based gaming can provide a high level of user satisfaction.

12:20 *Emotion in models meets emotion in design: building true affective games*
Barbara Giżycka and Grzegorz J. Nalepa (AGH University of Science and Technology, Poland)
To bring together affect models and emotion-driven frameworks in affective gaming, we propose an approach based on affective game design patterns. We provide a description of experiments conducted to test our hypothesis so far, along with some tentative observations.

12:40 *In-game motion dynamics provide a means of exploring the cognitive dynamics of deception*
Denis O Hora (NUI Galway, Ireland); Sam Redfern (NUIG, Ireland); Nicholas Duran (Arizona State University, USA); Arkady Zgonnikov (University of Aizu, Japan); Daragh Sweeney (National University of Ireland Galway, Ireland)
Our findings indicate that in-game motion is influenced by the cognitive processes underlying deception. In-game motion provides a source of data on psychological processes that can stimulate theoretical progress within psychology and contribute to the development of credible artificial agents.

Friday, August 17, 13:00 - 13:15

L3: Lunch

Room: Lobby

Friday, August 17, 13:15 - 14:05

Keynote: Martin Walsh: Mixed Reality - A Game Changer for Interactive Audio Technology

Mixed Reality (MR) brings with it the promise of a future where synthetic experiences are perceived to coexist with the reality of our physical world. While the technological consequences of this future are often discussed and researched for optical and imaging technologies, they are less well understood for the equivalent audio components of those experiences. True-to-life audio synthesis and reproduction is a vital component of the cues that lead to a sufficient suspension-of-disbelief necessary for a fully immersive MR experience. This brings many new challenges and opportunities for interactive audio synthesis and rendering algorithms along several application categories, including gaming, entertaining and social interaction.
Room: Theatre 1

Friday, August 17, 14:05 - 14:50

Keynote: Brian Markwalter

The Consumer Technology Association has tracked consumer use and interest in AR/VR for several years. Now that we are a couple of years into widespread offerings on a variety of platforms, what do consumers think? This talk will address consumer sentiment on AR/VR and emerging B2B use cases. We will also dig into the trove of CTA data to look at the bigger picture of the many entertainment options available to consumers, which tech products consumers are buying and how they find and use content. Brian Markwalter is senior vice president of research and standards for the Consumer Technology Association (CTA)™, the preeminent trade association promoting growth in the $321

billion U.S. consumer technology industry. CTA also owns and produces CES® - the world's gathering place for all who thrive on the business of consumer technology. Markwalter is responsible for CTA's extensive consumer research, market data and forecasting capability, and CTA's ANSI-accredited standards development program which develops technical standards used in millions of products every year.

Room: Theatre 1

Friday, August 17, 14:50 - 15:10

PE3: Poster Elevator Pitches

Room: Theatre 1

Friday, August 17, 15:10 - 15:50

VR Exhibits 3

Room: Lobby2

15:10 *Mixed Reality Therapy Clinic Design: The ergonomics and workflow of a technology-assisted therapeutic practice*
John Francis Leader (University College Dublin, Ireland)
The traditional idea of a psychotherapy room is typically one drawn from the earlier part of the last century. The design of a mixed reality technology-assisted practice is considered and ergonomic and workflow factors are explored. A template is suggested that retains the familiarity of the classic model whilst embracing the benefits of immersive technology.

15:30 *Engineering a mobile VR experience with MEMS 9DOF motion controller*
Lionel Jayaraj, James Wood and Marcia Gibson (University Of Bedfordshire, United Kingdom (Great Britain))
It has been argued that the VR (Virtual Reality) experience is only complete when it includes appropriate motion controls. To enhance immersion, the players' field of vision, movement and any actions they perform should be constrained as little as possible. In this paper, we discuss the engineering and user experience testing of a new mobile VR compatible controller which seeks to address limitations of typical VR controllers and joysticks in terms of the freedom of interactivity offered. The resulting artefact is a 9 DOF (Degrees of freedom) motion controller which uses Bluetooth to achieve connectivity to a mobile device. Sensor-based tracking is achieved by reengineering the existing MEMS (Micro Electro-mechanical System) available in some smart phone models to track motion. An HMD (Head Mounted display) is also designed using this technique. A framework and heuristics to measure immersion is developed and user experience tested comparatively during gameplay in a mobile VR sports simulation. Sensor efficiency is also tested via graph-simulator.

P3: Coffee, Posters, Exhibits

Room: Lobby

Delaying when all Dogs to go to Heaven: Virtual Reality Canine Anatomy Education Pilot Study
Xuanhui Xu, Eleni Mangina, David Kilroy, Arun Kumar and Abraham Campbell (University College Dublin, Ireland)
This paper takes a different approach in examining the use of VR in summative rather than formative assessment. It reports on how using open source tools, CT scans can be converted into a working 3D model that can be used to assess anatomy students abilities. These students already have individual access to a cadaver which would be considered the gold standard method of Anatomy education. So the research problem is to examine the advantages of summative assessment using VR where currently best practise is merely a multiple choice exam(MCQ).

Towards a conceptual framework for the development of immersive experiences to negotiate meaning and identity in Irish language learning
Naoise Collins (Dublin Institute Of Technology, Ireland); Brian Vaughan (Dublin Institute of Technology, Ireland); Charlie Cullen (University of the West of Scotland, United Kingdom (Great Britain)); Keith Gardiner (Dublin Institute Of Technology, Ireland)
The onset of virtual reality systems allows for new immersive content which provides users with a sense of presence in their virtual environment. This paper provides the conceptual framework for a larger study examining how designed virtual reality experiences can be utilised to transform Irish language meaning making and a user's personal Irish language identity

Virtual Reality Bicycle with Data-Driven Vibrotactile Responses from Road Surface Textures
Ruslan Rakhmatov, Arsen Abdulali, Waseem Hassan, Minji Kim and Seokhee Jeon (Kyung Hee University, Korea)
In this paper, we proposed a data-driven vibrotactile rendering system for indoor exercise bicycles. The input of the data-driven model is described by a two-dimensional vector of cycling velocity and tire pressure. We designed a data-collection bike that captures vibrations induced at the handlebar and the cycling velocity for different tire pressures. The data were collected from four real cycling pavements. The level of the tire pressure was varied according to subjects' weight. Data-driven input-output based haptic modeling was adapted for generating road surface texture models. A rendering system was also developed and integrated into the stationary bicycle, and four virtual textures were evaluated by experienced cyclists. The results show that the participants were able to successfully discriminate and identify simulated virtual road surfaces.

Mixing the Game Experience with the Experience of Meeting People
João Francisco (Instituto Superior Engenharia Lisboa, Portugal); Rui M. Jesus (Instituto Superior de Engenharia de Lisboa, Portugal)
This paper describes the game "Knowing your Sympathy", which was developed with the purpose of knowing or making the first contact with people. The paper also presents the main questions of the study conducted during the evaluation of the game. The study was performed for 2 weeks by 13 participants living in the same or nearby neighborhoods.

The Importance of Spatial Audio in Modern Games and Virtual Environments
James Broderick (National University of Ireland, Galway, Ireland); Sam Redfern and Jim Duggan (NUIG, Ireland)
This paper will look at not only why spatial audio can greatly improve virtual experiences, but also some of the new technologies that have become available in recent times which make the implementation of spatial audio far easier and of a higher quality than ever before. It will also look at some planned research to examine the advantages of spatial audio in sonified virtual environments using Unity 3D.

Session 3.8: Beyond Augmented Reality #2

Room: Theatre 2

15:10 *Bridging Authenticity and Virtualisation in Arcade Videogame Interaction*
Kieran Nolan (GV2 Research Group, Trinity College, Dublin)
JAMMAnode is a custom hardware and software solution that allows players to connect with original arcade hardware over a network connection, while reconstituting the material form of the arcade cabinet in digital space. As a piece of game art it uses the material of the JAMMA hardware interface to explore the boundaries of interfacing with the 'whole' arcade interface through remote digital means.As an experimental prototype, JAMMAnode attempts to bridge the gap in-between the authenticity and tangibility of experiencing arcade gameplay through original hardware and in situated space around the arcade cabinet, netplay, and the gameplay spectatorship afforded through livestreaming. As a media art installation JAMMAnode provides a meditation on the physicality of hardware both in its form and situated environment and the representational experience of these aspects through software.

15:30 *Bigger is Better: A VR Penguin Rehabilitation Simulation to Study Animal Conservation Behavior*
Daniel Pimentel (University of Florida & Media Effects and Technology Lab (METL), USA); Sriram Kalyanaraman and Shivashankar Halan (University of Florida, USA)
We present a VR simulation teaching users how to rehabilitate oil-slicked penguins. The simulation serves as a tool for (a) testing the "size matters" bias (human preference for protecting larger animals), (b) off-setting this bias, and (c) encouraging conservation behaviors.

Session 3.9: Theory & Philosophy of Gaming

Room: Theatre 1

15:10 *Rethinking Critical Thinking*
Gregory Garvey (Quinnipiac University, USA)
In 1869 Harvard University President Charles Eliot called for a "New Education." He argued that the "antiquated institutions" of higher education insufficiently prepared students "for the world beyond the academy" and to active participants in what Eliot termed "enlightened self-government (Davidson 2017). This paper argues that critical, design, systems, and algorithmic thinking must be part of the "New Education" for the 21st century.

15:30 *Are We Having Fun Yet? Misapplying Motivation to Gamification*
Kevin Loughrey and Daire O'Broin (Institute of Technology Carlow, Ireland)
Self-Determination Theory has emerged as a popular approach for explaining the motivational aspects of gamification, yet many of these applications use incorrect or specious interpretations of the theory. This purpose of this paper is to help rectify flaws in current practice.

Friday, August 17, 15:50 - 16:35

Keynote: Kay Meseberg

Kay Meseberg is the Head of Mission Innovation at the European cultural network ARTE, based in Strasbourg, France. Meseberg's research concentrates on immersive and interactive media. As Director of ARTE360, he produced numerous innovative works in immersive and interactive media, spanning a variety of fields in the arts and humanities. Meseberg maintains an active lecture circuit, including notable speaking engagements at SXSW Interactive, ZDF Digital at the Lichter Filmfest Frankfurt International, and the B3 Biennial of the Moving Image in Frankfurt, Germany.
Room: Theatre 1

Friday, August 17, 16:35 - 17:35

PN3: Panel Session 3: The Art of Immersion

This panel looks at the past, present, and future of immersive media technologies, discussing the critical intersections of art, design, and science in periods of rapid technological transformation.
Room: Theatre 1
Chair: Bryan Duggan (Dublin Institute of Technology, Ireland)