

# Intelligent Digital Games for Empowerment and Inclusion – an Introduction

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## ABSTRACT

Digital Games for Empowerment and Inclusion possess the potential to change our society in a most positive way by preparing selected groups in a playful and fun way for their everyday life's social and special situations. The current generation of such games thereby increasingly demands for computational intelligence algorithms to help analyze players' behavior and monitor their motivation and interest to adapt game progress. Intelligent Digital Games for Empowerment and Inclusion (IDGEI) focus in particular on such games in connection with machine intelligence and its inclusion in digital serious games. In this introduction and in this context, we summarize the first international workshop on IDGEI held at Foundations of Digital Games (FDG) 2013.

## Keywords

Machine Intelligence, Digital Games for Empowerment and Inclusion, Serious Games, Social Computing, Affective Computing

## 1. INTRODUCTION

Digital Games for Empowerment and Inclusion possess the potential to change our society in a most positive way by preparing selected groups in a playful and fun way for their everyday life's social and special situations. Exemplary domains span as far as from children with Autism Spectrum Condition (ASC) to young adults preparing for their first job interviews or migrants familiarizing with their new environment.

The current generation of such games thereby increasingly demands for computational intelligence algorithms to help analyze players' behavior and monitor their motivation and interest to adapt game progress.

The development of such games usually thus requires expertise from the general gaming domain, but in particular also

from a game's target domain, besides technological savoir-faire to provide intelligent analysis and reaction solutions. The first international Intelligent Digital Games for Empowerment and Inclusion (IDGEI) workshop held at Foundations of Digital Games 2013 aims at bridging across these communities and disciplines by inviting respective researchers and experts to commonly elaborate the latest perspectives and findings in the field of IDGEI.

IDGEI's topics cover among others aspects of Machine Intelligence in Serious Games, Mobile and Real-World Serious Gaming, Emotion & Affect in Serious Games, Player Behavior and Attention Modeling, Player-Adaptation and Motivation, Novel Serious Games, and User Studies & Tests of Serious Games. In fact, it seems necessary to bring forth existing efforts and major accomplishments in the design of intelligent serious games, and to provide a forum for exchange in experience with intelligent serious games in practice, while encouraging the design of novel applications in context as diverse as health-oriented gaming, general learning and driving environments, or emergency preparation, and to focus on current trends and future directions in the field.

In the ongoing, we will summarize the contributions made by the IDGEI workshop participants as found in the proceedings [1].

## 2. CONTRIBUTIONS

From the manifold submissions received, nine paper-contributions were selected within rigid peer-review by three reviewers per paper. Contributions with co-authorship of organisers of the event were reviewed and handled independently. Further, a best paper was selected from the final accepted papers. The content of these provides a good overview on current topics and research questions in the field of IDGEI.

The contributions can be grouped by three major aspects: First are the *social* aspects in Serious Gaming as first found in the paper "*Investigating Social Cue-Based Interaction in Digital Learning Games*" by Ionut Damian, Tobias Baur and Elisabeth André that investigates the potential of signal processing methods to generate social cue-based interaction in the context of a job interview simulation game. It thus focuses on automatic recognition of social cues by state-of-the-art sensors. It then elaborates on possibilities for the generation of believable interaction between player and game basing on such automatic social cue analysis.

Next, in “*The Four Keys of Social Impact Games*” Dana Ruggiero provides an overview on persuasive games with a social impact component. The introduction focuses on persuasive games in education in the last decade. Then, four keys are introduced and exemplified concerning social impact in relation to game design.

The project introduction “*ASC-Inclusion: Interactive Emotion Games for Social Inclusion of Children with Autism Spectrum Conditions*” by Björn Schuller, Erik Marchi, Simon Baron-Cohen, Helen O’Reilly, Peter Robinson, Ian Davies, Ofer Golan, Shimrit Friedenson, Shahar Tal, Shai Newman, Noga Meir, Roi Shillo, Antonio Camurri, Stefano Piana, Sven Bölte, Daniel Lundqvist, Steve Berggren, Aurelie Baranger and Nikki Sullings deals with a serious game dedicated to individuals with ASC – neurodevelopmental conditions, characterized by social communication difficulties and restricted and repetitive behaviour patterns. A serious game platform is introduced, based on analysis of gestures of ASC child players, and facial and vocal expressions, as well as video and audio clips to provide interactive emotion games for an ‘emotional workout’.

The following set of three contributions is centred around *intelligence* in digital games. First, “*A set of Full-Body Movement Features for Emotion Recognition to Help Children affected by Autism Spectrum Conditions*” by Stefano Piana, Alessandra Staglianò, Antonio Camurri and Francesca Odone highlights the body gesture analysis details of the ASC-Inclusion engine (cf. above). This includes the introduction of a feature set for 2D and 3D analysis. Then, Dictionary Learning is suggested by the authors to lead to actual emotion classification. Feature relevance analysis is based on empirical studies.

Then, in “*EShadow: A Tool for Digital Storytelling Based on Traditional Greek Shadow Theatre*” the authors – Marios Christoulakis, Andreas Pitsiladis, Argiro Moraiti, Nektarios Moumoutzis and Stavros Christodoulakis – elaborate on the use of storytelling in children education and positive effects in their learning and creativity process. In particular, a storytelling tool inspired by Greek traditional shadow theater is presented that can be used to create, record, share and watch digital shadow theater plays. Its virtual puppets can be controlled by mouse or motion sensing. The authors include experience from application of the tool in two elementary schools in Greece.

Next, “*Serious Game Design for Inclusivity and Empowerment in SmartGrids*” by Aikaterini Bourazeri and Jeremy Pitt deals with management of electricity generation and supply and use of Smart Meters for monitoring behaviour. Due to concerns about trust and privacy, and to support inclusivity and empowerment for user engagement, the authors argue for emphasising on demand-side self-organisation as supported by specific design principles, including support for self-governance, multiple user roles and collective awareness.

The last group presents games for empowerment and inclusion, starting with the paper “*Developing a Digital Game to Support Cultural Learning amongst Immigrants*” by Ian Dunwell, Petros Lameris, Craig Stewart, Pangiotis Petridis, Sylvester Arnab, Maurice Hendrix, Sara de Freitas, Mark Gaved, Björn Schuller and Lucas Paletta that aims to help immigrants and avoid isolation or fragmented communities and a range of social issues. The featured Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Ser-

vices (MASELTOV) project combines practical tools and learning services via mobile devices for immigrants. The authors present the game-based learning aspect focussing on mobile platforms and emergent data capture techniques in this context and compare to other relevant projects, ultimately leading to a set of recommendations.

The next serious gaming platform is “*TARDIS – A simulation platform with an affective virtual recruiter for job interviews*”, as introduced by Hazaël Jones and Nicolas Sabouret. It aims to help young people not in employment to overcome typical lack in self-confidence and establish essential social skills as needed when applying for jobs. The TARDIS gaming platform is a scenario and simulation-based one. In this context, a model is proposed for a socio-emotionally realistic virtual agent as ‘virtual recruiter’.

Finally, in “*Traveller – Intercultural training with intelligent agents for young adults*” Nick Degens, Gert Jan Hofstede, Samuel Mascarenhas, André Silva, Ana Paiva, Felix Kistler, Elisabeth André, Aleksandra Swiderska, Eva Krumhuber, Arvid Kappas, Colette Hume, Lynne Hall and Ruth Aylett describe the serious game Traveller – also dedicated for young adults. It is based on key concepts of intercultural training. The player progresses through a creative story engaging with intelligent virtual non-player characters of different cultures. This shall help avoid future misunderstandings and conflicts in real-life encounters by deepening the understanding of the behavioural differences due to differences in culture.

IDGEI’s keynote speech by Shai Newman and its technical demo session further demonstrate intelligent serious gaming platforms’ richness as described above and their readiness for usage to help millions of potential future players learn and reach crucial skills in an enjoyable and fun way.

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## 3. REFERENCES

- [1] B. Schuller, L. Paletta, and N. Sabouret, editors. *Proceedings 1st International Workshop on Intelligent Digital Games for Empowerment and Inclusion (IDGEI 2013) held in conjunction with the 8th Foundations of Digital Games 2013 (FDG)*, Chania, Greece, May 2013. SASDG.