

**Schedule IEEE CIG 2018 August 14-17, 2018**

Tuesday, August 14	
8:30-9:15	Registration ( <i>Ad Fundum</i> )
9:15-9:30	Opening ( <i>Aula</i> )
9:30-10:30	Keynote I: Julian Schrittwieser ( <i>Aula</i> )
10:30-11:00	Coffee Break ( <i>Ad Fundum</i> )
11:00-12:40	Best Paper Session I ( <i>Aula</i> )
12:40-13:40	Lunch ( <i>Mensa</i> )
13:40-14:30	Best Paper Session II ( <i>Aula</i> )
14:30-15:20	Session 1 ( <i>Aula</i> )
15:20-15:50	Coffee ( <i>Ad Fundum</i> )
15:50-17:05	Poster - Demo Session ( <i>Ad Fundum</i> )
17:30-18:30	Reception ( <i>City Hall</i> )

Wednesday, August 15	
8:30-9:00	Registration ( <i>Ad Fundum</i> )
9:00-10:00	Keynote II: Elisabeth André ( <i>Aula</i> )
10:00-10:30	Coffee Break ( <i>Ad Fundum</i> )
10:30-12:20	Session 2 ( <i>Aula</i> )      Tutorial 1 ( <i>H0.06</i> )
12:20-13:50	Lunch ( <i>Mensa</i> ) & GTC Meeting ( <i>Aula 13:00-13:45</i> )
13:50-15:30	Special Session 1 ( <i>Aula</i> )      Session 3 ( <i>H0.06</i> )
15:30-16:00	Coffee Break ( <i>Ad Fundum</i> )
16:00-18:00	Competitions ( <i>Aula</i> )      Special Session 2 +3 ( <i>H0.06</i> )

Thursday, August 16	
8:30-9:00	Registration ( <i>Ad Fundum</i> )
9:00-10:00	Keynote III: Jens Piesk ( <i>Aula</i> )
10:00-10:30	Coffee Break ( <i>Ad Fundum</i> )
10:30-12:20	Session 4 ( <i>Aula</i> )      Tutorial 2 ( <i>H0.06</i> )
12:20-13:30	Lunch ( <i>Mensa</i> ) & ToG Meeting
13:30-15:10	Session 5a ( <i>Aula</i> )      Session 5b ( <i>H0.06</i> )
15:45-18:00	Boat Tour ( <i>Rederij Stiphout</i> )
19:00-22:00	Diner ( <i>Thiessen Wijnkoopers</i> )

Friday, August 17	
8:30-9:00	Registration ( <i>Ad Fundum</i> )
9:00-10:00	Keynote IV: Arjen Beij ( <i>Aula</i> )
10:00-10:30	Coffee Break ( <i>Ad Fundum</i> )
10:30-12:20	Session 6 ( <i>Aula</i> )      Tutorial 3 ( <i>H0.06</i> )
12:20-13:50	Lunch ( <i>Mensa</i> )
13:50-15:30	Session 7a ( <i>Aula</i> )      Session 7b ( <i>H0.06</i> )
15:30-16:00	Coffee Break ( <i>Ad Fundum</i> )
16:00-17:15	Session 8 ( <i>Aula</i> )
17:15-17:45	Closing ( <i>Aula</i> )

# Sessions Overview

## Tuesday August 14

### Best Paper Session I

Chair: Jialin Liu

Aula, 11:00-12:40

- 11:00-11:25: Hendrik Baier and Peter I. Cowling. *Evolutionary MCTS for Multi-Action Adversarial Games*
- 11:25-11:50: Christoph Salge, Christian Guckelsberger, Rodrigo Canaan and Tobias Mahlmann. *Accelerating Empowerment Computation with UCT Tree Search*
- 11:50-12:15: Raluca Gaina, Simon Lucas and Diego Perez Liebana. *General Win Prediction from Agent Experience*
- 12:15-12:40: Christian Guckelsberger, Christoph Salge and Julian Togelius. *New and Surprising Ways to be Mean: Adversarial NPCs with Coupled Empowerment Minimisation*

### Best Paper Session II

Chair: Mike Preuss

Aula, 13:40-14:30

- 13:40-14:05: Rodrigo de Moura Canaan, Haotian Shen, Ruben Torrado, Julian Togelius, Andy Nealen and Stefan Menzel. *Evolving Agents for the Hanabi 2018 CIG Competition*
- 14:05-14:30: Cameron Browne. *Modern Techniques for Ancient Games*

### Session 1: Real-Time Strategy Games

Chair: Santiago Ontañón

Aula, 14:30-15:20

- 14:30-14:55: Mike Preuss, Thomas Pfeiffer, Vanessa Volz and Nicolas Pflanzl. *Integrated Balancing of an RTS Game: Case Study and Toolbox Refinement*
- 14:55-15:20: Anderson R. Tavares and Luiz Chaimowicz. *Tabular Reinforcement Learning in Real-Time Strategy Games via Options*

### Poster and Demo Session

Ad Fundum, 15:50-17:05

Posters:

- Garry Greenwood, Hussein Abbass and Eleni Petraki. *A Critical Analysis of Punishment in Public Goods Games*
- Rahul Dubey, Joseph Ghantous, Sushil Louis and Siming Liu. *Evolutionary Multi-objective Optimization of Real-Time Strategy Micro*
- Aavaas Gajurel, Sushil J. Louis, Daniel J. Méndez and Siming Liu. *Neuroevolution for RTS Micro*
- Ryota Ishii, Suguru Ito, Makoto Ishihara, Tomohiro Harada and Ruck Thawonmas. *Monte-Carlo Tree Search Implementation of Fighting Game AIs Having Personas*
- Amin Babadi, Kourosh Naderi and Perttu Hämäläinen. *Intelligent Middle-Level Game Control*
- Makoto Ishihara, Suguru Ito, Ryota Ishii, Tomohiro Harada and Ruck Thawonmas. *Monte-Carlo Tree Search for Implementation of Dynamic Difficulty Adjustment Fighting Game AIs Having Believable Behaviors*
- Fernando De Mesentier Silva, Julian Togelius, Frank Lantz and Andy Nealen. *Generating Novice Heuristics for Post-Flop Poker*

- Zuozhi Yang and Santiago Ontañón. *Learning Map-Independent Evaluation Functions for Real-Time Strategy Games*
- Sandra Kaczmarek and Sintija Petroviča. *Promotion of Learning Motivation through Individualization of Learner-Game Interaction*
- Samuel Mascarenhas, Manuel Guimarães, Rui Prada, João Dias, Pedro A. Santos, Kam Star, Ben Hirsh, Ellis Spice and Rob Kommeren. *A Virtual Agent Toolkit for Applied Game Developers*
- Chrysanthi Tziortzioti, Irene Mavrommati, Georgios Mylonas, Andrea Vitaletti and Ioannis Chatzigiannakis. *Scenarios for Educational and Game Activities using Internet of Things Data.*
- Emil Gensby, Anders Harbøll Christiansen and Bo Friis Nielsen. *Multi-Parametrised Matchmaking: A Framework*
- Adam Streck and Thomas Wolbers. *Using Discrete Time Markov Chains for Control of Idle Character Animation*
- Martin L.M. Rooijackers and Mark H. M. Winands. *Wall Building in the Game of StarCraft with Terrain Considerations*
- Yoshina Takano, Wenwen Ouyang, Suguru Ito, Tomohiro Harada and Ruck Thawonmas. *Applying Hybrid Reward Architecture to a Fighting Game AI*
- Bryan Weber. *Standard Economic Models in Nonstandard Settings- StarCraft: Brood Wars*
- Jichen Zhu, Antonios Liapis, Sebastian Risi, Rafael Bidarra and Michael Youngblood. *Explainable AI for Designers: A Human-Centered Perspective on Mixed-Initiative Co-Creation*

*Demo:*

- Baek In-Chang and Kim Kyung-Joong. *Web-based Interface for Data Labeling in StarCraft*

## Wednesday August 15

### Session 2: Decision Making

Chair: Raluca Daniela Gaina

Aula, 10:30-12:20

- 10:30-10:55: Philip Rodgers, John Levine and Damien Anderson. *Ensemble Decision Making in Real-Time Games*
- 10:55-11:20: Michael Nixon, Steve Dipaola and Ulysses Bernardet. *An Eye Gaze Model for Controlling the Display of Social Status in Believable Virtual Humans*
- 11:25-11:50: Ivan Bravi, Diego Perez, Simon Lucas and Jialin Liu. *Shallow Decision-Making Analysis in General Video Game Playing*
- 11:50-12:15: Simon M. Lucas. *Game AI Research with Fast Planet Wars Variants*

### Tutorial 1: Conducting Machine Learning Research within Custom-made 3D Game Environments

Miguel Suau

H0.06, 10:30-12:20

### Special Session 1: Deep Learning in Games

Chairs: Niels Justesen & Philip Bontrager

Aula, 13:50-15:30

- 13:50-14:15: Ruben Rodriguez Torrado, Philip Bontrager, Julian Togelius, Jialin Liu and Diego Perez Liebana. *Deep Reinforcement Learning in the General Video Game AI Framework*
- 14:15-14:40: Jack Harmer, Linus Gisslén, Jorge del Val, Henrik Holst, Joakim Bergdahl, Tom Olsson, Kristoffer Sjöo and Magnus Nordin. *Imitation Learning with Concurrent Actions in 3D Games*
- 14:40-15:05: Niels Justesen and Sebastian Risi. *Automated Curriculum Learning by Rewarding Temporally Rare Events*
- 15:05-15:30: William Woof and Ke Chen. *Learning to Play General Video-Games via an Object Embedding Network*

### Session 3: Board Games and Puzzles

Chair: Cameron Browne

H0.06, 13:50-15:30

- 13:50-14:15: Shanchuan Wan and Tomoyuki Kaneko. *Building Evaluation Functions for Chess and Shogi with Uniformity Regularization Networks*
- 14:15-14:40: Daniel Ashlock and Courtney Kolthof. *Evolving Number Sentence Puzzles*
- 14:40-15:05: Jakub Kowalski and Andrzej Kisielewicz. *Regular Language Inference for Learning Rules of Simplified Boardgames*
- 15:05-15:30: Magnus Gedda, Mikael Zayenz Lagerkvist and Martin Butler. *Monte-Carlo Methods for the Game Kingdomino*

### Competitions

Chair: Diego Perez-Liebana

Aula, 16:00-18:00

- Short Video Competition
- Hearthstone AI
- The Ms. Pac-Man Vs Ghost Team Competition
- Fighting Game AI Competition
- microRTS Competition

- Hanabi Competition
- StarCraft AI Competition
- The General Video Game AI Competition – Learning Track
- 3rd Angry Birds Level Generation Competition
- The Text-Based Adventure AI Competition
- Visual Doom AI Competition 2018

### **Special Session 2: Intelligent Games for Learning**

*Chair: Bradford Mott*

H0.06, 16:00-17:00

- 16:00-16:25: Maria Cutumisu. *The Influence of Feedback Choice on University Students' Revision Choices and Performance in a Digital Assessment Game*
- 16:25-16:50: Gabriel Toschi de Oliveira, Hugo Henriques Pereira, Claudio Fabiano Motta Toledo, Seiji Isotani and Geiser Chaclo Chalco. *A Plot from the Stars: Educational Game Development for Teaching Basic Mathematical Functions*
- 16:50-16:55: Sandra Kaczmarek and Sintija Petroviča. *Promotion of Learning Motivation through Individualization of Learner-Game Interaction*
- 16:55-17:00: Samuel Mascarenhas, Manuel Guimarães, Rui Prada, João Dias, Pedro A. Santos, Kam Star, Ben Hirsh, Ellis Spice and Rob Kommeren. *A Virtual Agent Toolkit for Applied Game Developers*

### **Special Session 3: Integrating IoT technologies with Serious Games**

*Chair: Evaggelos Spyrou*

H0.06, 17:00-17:55

- 17:00-17:25: Evaggelos Spyrou, Nicholas Vretos, Andrew Pomazanskyi, Stylianos Asteriadis and Helen Leligou. *Exploiting IoT Technologies for Personalized Learning*
- 17:25-17:50: Pavlos Kosmides, Konstantinos Demestichas, Evgenia Adamopoulou, Nikos Koutsouris, Yannis Oikonomidis and Vanessa De Luca. *InLife: Combining Real Life with Serious Games using IoT*
- 17:50-17:55: Chrysanthi Tziortzioti, Irene Mavrommati, Georgios Mylonas, Andrea Vitaletti and Ioannis Chatzigiannakis. *Scenarios for Educational and Game Activities using Internet of Things Data.*

## Thursday August 16

### Session 4: Search

Chair: Mark Winands

Aula, 10:30-12:20

- 10:30-10:55: Devon Sigurdson, Vadim Bulitko, William Yeoh, Carlos Hernández and Sven Koenig. *Multi-Agent Pathfinding with Real-Time Heuristic Search*
- 10:55-11:20: Oleksandra Keehl and Adam Smith. *Monster Carlo: An MCTS-based Framework for Machine Playtesting Unity Games*
- 11:25-11:50: Vadim Bulitko and Kacy Doucet. *Anxious Learning in Real-Time Heuristic Search*
- 11:50-12:15: Chiara F. Sironi and Mark H. M. Winands. *Analysis of Self-Adaptive Monte Carlo Tree Search in General Video Game Playing*

### Tutorial 2: Learning to Play: The Multi-Agent Reinforcement Learning on Malmo Competition

Diego Perez-Liebana & Raluca Daniela Gaina

H0.06, 10:30-12:20

### Session 5a: Competition Agents

Chair: Diego Perez-Liebana

Aula, 13:30-15:10

- 13:30-13:55: Pavan Kantharaju, Santiago Ontañón and Christopher Geib.  *$\mu$ CCG, a CCG-based Game-Playing Agent for  $\mu$ RTS*
- 13:55-14:20: Maciej Świechowski, Tomasz Tajmajer and Andrzej Janusz. *Improving Hearthstone AI by Combining MCTS and Supervised Learning Algorithms*
- 14:20-14:45: Alexander Dockhorn and Daan Apeldoorn. *Forward Model Approximation for General Video Game Learning*
- 14:45-15:10: Kun Shao, Dongbin Zhao, Nannan Li and Yuanheng Zhu. *Learning Battles in ViZDoom via Deep Reinforcement Learning*

### Session 5b: Game Design

Chair: Daniel Ashlock

H0.06, 13:30-15:10

- 13:30-13:55: André Siqueira Ruela and Karina Valdivia Delgado. *Scale-Free Evolutionary Level Generation*
- 13:55-14:20: Jakub Kowalski, Radoslaw Miernik, Piotr Pytlik, Maciej Pawlikowski, Krzysztof Piecuch and Jakub Sekowski. *Strategic Features and Terrain Generation for Balanced Heroes of Might and Magic III Maps*
- 14:20-14:45: Michael Cook, Simon Colton and Azalea Raad. *Inferring Design Constraints From Game Ruleset Analysis*
- 14:45-15:10: Daniel Karavolos, Antonios Liapis and Georgios N. Yannakakis. *Using a Surrogate Model of Gameplay for Automated Level Design*

## Friday August 17

### Session 6: Machine Learning I

Chair: Simon Lucas

Aula, 10:30-12:20

- 10:30-10:55: Mohammed Salem, Antonio Mora and Juan J. Merelo. *The Evolutionary Race: Improving the Process of Evaluating Car Controllers in Racing Simulators*
- 10:55-11:20: Per-Arne Andersen, Morten Goodwin and Ole-Christoffer Granmo. *Deep RTS: A Game Environment for Deep Reinforcement Learning in Real-Time Strategy Games*
- 11:25-11:50: Paul Bertens, Anna Guitart, Pei Pei Chen and Africa Perianez. *A Machine-Learning Item Recommendation System for Video Games*
- 11:50-12:15: Stefan Gudmundsson, Philipp Eisen, Erik Poromaa, Alex Nodet, Sami Purmonen, Richard Meurling, Bartłomiej Kozakowski and Lele Cao. *Human-Like Playtesting with Deep Learning*

### Tutorial 3: Ranking Mechanisms in Games

Boris Naujoks & Vanessa Volz

H0.06, 10:30-12:20

### Session 7a: Machine Learning II

Chair: Vanessa Volz

H0.06, 13:50-15:30

- 13:50-14:15: Frank Glavin and Michael Madden. *Skilled Experience Catalogue: A Skill-Balancing Mechanism for Non-Player Characters using Reinforcement Learning*
- 14:15-14:40: Myat Aung, Valerio Bonometti, Anders Drachen, Peter Cowling, Athanasios Kokkinakis and Alex Wade. *Predicting Skill Learning Outcomes in a Large, Longitudinal MOBA dataset*
- 14:40-15:05: Luiz Bernardo Martins Kummer, Júlio César Nievola and Emerson Cabrera Paraiso. *Applying Commitment to Churn and Remaining Players Lifetime Prediction*
- 15:05-15:30: Chrysoula Varia, Georgios Tsatiris, Kostas Karpouzis and Stefanos Kollias. *A Refined 3D Dataset for the Analysis of Player Actions in Exertion Games*

### Session 7b: Card and Mathematical Games

Chair: Chiara Sironi

H0.06, 13:50-15:30

- 13:50-14:15: Sam Ganzfried and Qinyung Sun. *Bayesian Opponent Exploitation in Imperfect-Information Games*
- 14:15-14:40: Zhengxing Chen, Chris Amato, Truong Nguyen, Seth Cooper, Yizhou Sun, and Magy Seif El-Nasr. *Q-DeckRec: a Fast Deck Recommendation System for Collectible Card Games*
- 14:40-15:05: Daniel Ashlock, Eun-Youn Kim and Diego Pérez-Liébana. *Toward General Mathematical Game Playing*
- 15:05-15:30: Rutger Kraaijer, Marc van Kreveld, Wouter Meulemans and André van Renssen. *Geometry and Generation of a New Graph Planarity Game*

## **Session 8: Vision Papers**

*Chair: Julian Togelius*

Aula, 16:00-17:15

- 16:00-16:25: Cristina Guerrero-Romero, Simon Lucas and Diego Perez-Liebana. *Using a Team of General AI Algorithms to Assist Game Design and Testing*
- 16:25-16:50: Rodrigo Canaan, Stefan Menzel, Julian Togelius and Andy Nealen. *Towards Game-based Metrics for Computational Co-Creativity*
- 16:50-17:15: Vanessa Volz, Kevin Majchrzak and Mike Preuss. *A Social Science-based Approach to Explanations for (Game) AI*