

# The AIIDE 2015 Workshop Program

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■ *The workshop program at the 11th Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment was held November 14–15, 2015, at the University of California, Santa Cruz, USA. The program included four workshops (one of which was a joint workshop): Artificial Intelligence in Adversarial Real-Time Games, Experimental AI in Games, Intelligent Narrative Technologies and Social Believability in Games, and Player Modeling. This article contains the reports of three of the four workshops.*

The workshop program at the 11th Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment was held November 14–15, 2015, at the University of California, Santa Cruz, USA. The program included four workshops (one of which was a joint workshop): (1) Artificial Intelligence in Adversarial Real-Time Games, organized by Michael Buro and Santiago Ontañón; (2) Experimental AI in Games, organized by Alex Zook, Mike Cook, and Antonios Liapis; (3) a joint workshop — Intelligent Narrative Technologies and Social Believability in Games, organized by Camille Barot, Boyang “Albert” Li, Jonathan Rowe, Emmett Tomai (all organizing Intelligent Narrative Technologies), and Harko Verhagen, Mirjam Palosaari Eladhari, Josh McCoy, and Magnus Johansson (organizing Social Believability in Games) (4) Player Modeling, organized by Noor Shaker, Georgios Yannakakis, and Pieter Spronck. The Experimental AI in Games workshop was held Saturday, November 14. The other workshops were held Sunday, November 15, 2015. This article contains reports from the first three workshops. No report was submitted by the organizers of the Player Modeling workshop.

## Artificial Intelligence in Adversarial Real-Time Games

Real-time strategy (RTS) games are complex real-time war simulations in which players have to manage economies, build structures and armies, and try win by destroying all opponents' buildings. RTS games are interesting from an AI point of view because their decision complexity, generated by vast maps, large unit numbers, concurrent durative actions, and limited state observability, precludes solutions based on brute-force search and forces us to consider problem decompositions and abstractions. This workshop's goal was to bring researchers together who are interested in pushing the state of the art of RTS game AI systems and to discuss current and future research directions that can get us closer to constructing programs able to defeat the best human RTS game players.

In the AIIDE main conference four years ago several papers on the subject were presented. In addition, a panel discussion on RTS game AI took place, the StarCraft competition was discussed, prizes were awarded, and two exhibition match replays were shown. In order to provide a more focused group to address these topics, the first workshop on RTS game AI was organized at AIIDE 2012, attracted 20 attendees, and featured 9 paper presentations and a discussion that led to fruitful collaboration. In this year's workshop, four papers and this year's AIIDE StarCraft AI competition report were presented. Additionally three productive work groups took place.

This year's papers focused mostly on evaluation methodologies for RTS game AI techniques, and on forward models for RTS games, which are necessary for the deployment of standard game tree search techniques such as alpha-beta search or Monte Carlo tree search. Additionally, one paper focused on a general local-search software library designed to address many sub-problems appearing in RTS game AI.

The first workgroup focused on the problem of abstraction and discussed questions such as how can we design game AI techniques that reason at multiple levels of abstraction, how can communication flow across levels, and how decisions at these different levels should be evaluated.

The second workgroup focused on the definition of benchmark scenarios for StarCraft agents, as a follow-up discussion to one of the presented papers, proposing a unified set of benchmarks to compare StarCraft bots. Workshop attendees designed a large set of scenarios that cover different aspects of the RTS game play. To measure progress in the field and provide a standard way to compare approaches, attendees will prepare these scenarios and share them publicly with the whole community.<sup>1</sup>

Finally, the last workgroup focused on the possibility of defining a  $k$ -button StarCraft. The key idea is that a major roadblock in games like StarCraft is the

very large branching factor. If we can define a simplified version that removes this branching factor altogether, we would be able to skip this problem and focus on many other important research problems that are right now impossible to work on because of the branching factor.

This report was written by workshop co-organizers Michael Buro and Santiago Ontañón. The papers of the workshop were published as AAAI Press Technical Report WS-15-01, and papers are available in the AAAI Digital Library. AIIDE StarCraft AI competition results, software, and game video are hosted at [starcraftai.competition.com](http://starcraftai.competition.com).

## Experimental AI in Games

The second Experimental AI in Games (EXAG) workshop brought together both the 2014 Experimental AI in Games and the 2013 AI and Game Aesthetics workshops at AIIDE under a unified banner, with the aim of fostering innovation in how AI is used in and for games. We affectionately described the workshop as a celebration of "half-working things and half-baked ideas." Games are growing broader and more experimental with each passing year, and academe must match this pace in order to remain ahead of the technological curve. The Experimental AI in Games workshop aims to bridge the two extreme ideals of academic research: unstable, bleeding-edge ideas about the future of games, and useful, practical research embedded into playable experiences. We are interested both in new ideas that have not yet found a place in conference-level research, and in concrete examples of new kinds of game-play experience made possible through academic research. The Experimental AI in Games workshop accepted 12 papers and three tutorials for its two-day workshop, along with numerous playable demonstrations. A summary of some of the workshop's themes is provided in this report. Two papers addressed the new idea of player vision influencing content generation. Jonathan Tremblay and Clark Verbrugge (McGill University) presented work on placing decorative content in game levels based on areas that a player traversing a level would always see, sometimes see, or never see. Meanwhile, Michael Cook (Falmouth University) presented a system that generated level geometry based on predefined areas that should be visible (or not) to the player.

Vital work on analyzing player relationships with their avatar was presented by Dominic Kao and Fox Harrell (MIT) with studies on how player avatars affect performance and engagement in a game. This work was complemented by the work of Chong-U Lim and Fox Harrell (MIT), which investigates how character customization can offer insights into players' implicit perception of themselves and others. Both papers have major future ramifications for game designers of all genres. This year's workshop had a

strong dedication to producing playable experiences embodying a research idea. James Owen Ryan, Adam Summerville, Michael Mateas, and Noah Wardrip-Fruin (University of California, Santa Cruz) described work on an AI framework modeling knowledge transfer intended to breathe new life into open world games. Martin Cerny (Charles University in Prague) presented Sarah and Sally, a puzzle game where NPC companions are neither too pushy nor too distant. Studies on player reactions to the NPC fostered discussion on how players relate to AI companions.

Multiple papers presented new perspectives on generating game content. Adam Summerville (University of California, Santa Cruz) presented two approaches to using machine learning from existing human designs to generate new content. One used Markov chains guided by Monte Carlo tree search (coauthored with Shweta Philip and Michael Mateas of the University of California, Santa Cruz) for Mario levels, and another used Bayes nets and principal component analysis for Zelda dungeon generation (coauthored with Michael Mateas of University of California, Santa Cruz). Dan Ventura showed work coauthored with Dean Lebaron and Logan Mitchell (Brigham Young University) on a game that invents game rules and levels using a combination of Q-learning and evolution.

We hope to see more blended approaches to procedural content generation in future workshops. Not all submissions fit neatly into a theme, but they still provided stand-out presentations and food for thought. Antonios Liapis (University of Malta) showed how the Sentient Sketchbook had benefited from becoming a live web service, and argued for AI services as a future trend in content generation. Jeremy Gow and Joseph Corneli (Goldsmiths University) presented a technique for blending two game designs, including an impressive demonstration of Frogger-Meets-Zelda Frola. Finally, Ian Horswill (Northwestern University) spoke passionately about a mixed-initiative tool to generate scenarios in the improv role-playing game Fiasco.

The workshop also hosted tutorials, demonstration sessions, some game development sessions in the evening, and some thought-provoking boardgame sessions. The workshop has gone from strength to strength over the past few years and we look forward to the future.

This report was written by workshop organizers and cochairs Alexander Zook, Antonios Liapis, and Michael Cook; the papers of the workshop were published as AAAI Press Technical Report WS-15-21, and are available in the AAAI Digital Library.

## Intelligent Narrative Technologies and Social Believability in Games

Narrative is a critical element of human communication and cognition. It is one of the fundamental

frameworks by which people view the world and comprehend their experiences. As computing increasingly pervades our lives, through social interaction, education, and entertainment, the need for computational models to organize, create, mediate, and understand stories has grown likewise.

The goal of the Intelligent Narrative Technologies workshop was to bring together a diverse community of computer scientists, narratologists, psychologists, artists, and game industry practitioners to discuss the generation, analysis, and understanding of interactive and noninteractive stories. The origin of the workshop can be traced back to AAAI symposia in 1997 and 1999. In 2010, it became an annual workshop. After successfully colocating with the Electronic Literature Organization Conference last year, 2015 marks the return of the Intelligent Narrative Technologies workshop to the AIIDE conference.

Social believability in game characters is concerned with the interplay between intelligent behavior that is task related, the emotions that may be attached to events in a game world, and the social positioning and interaction of deliberating entities. Although AI has been part of creating “worthy” opponents in games, the social aspect of intelligent behavior has been relatively neglected. The Social Believability in Games workshop aims to address this by putting forward models, theories, and demonstrations of work in the integration of those three aspects of intelligent behavior.

The meeting was a two-day event, including one invited speaker, 4 long presentations, 10 short presentations, and four posters. Thirty-six registered participants attended the meeting.

The workshop opened with an invited talk by Iolanda Leite from Disney Research. Leite discussed her research on human-robot interaction (HRI), with an emphasis on studying how to maintain children’s interest in long-term interactions with robots and how children interact with robots in interactive storytelling scenarios. She concluded by pointing out potential synergies, and collaboration opportunities, between the human-robot interaction and intelligent narrative technologies workshop communities.

Paper presentations in this year’s meeting covered a broad range of topics. Work on virtual characters that act according to social norms, select their actions aesthetically, engage in conversations, and tell conversational stories received considerable attention. A second major theme was the generation of story structure, story discourse, and story text. Several papers exemplified the interdisciplinary nature of the workshop, exploring psychological theories of emotion, notions of ambient narrative from the humanities, culturally believable virtual characters and their intersection with artificial intelligence.

To foster cross-pollination of ideas and encourage divergent thinking, the workshop’s final session focused on an hour-long discussion of grand chal-

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allenges for the intelligent narrative technologies and social believability in games communities. Grand challenge ideas ranged from creating a Booker Prize-winning AI novelist, to enabling a holodeck in every living room, to generating a leading international newspaper generated and published entirely by an AI. Participants discussed the technological requirements for addressing these challenges and the potential societal impacts of such developments.

The cochairs of the workshop were Camille Barot, Boyang “Albert” Li, Jonathan Rowe, Emmett Tomai, Mirjam Eladhari, Magnus Johansson, Josh McCoy, and Harko Verhagen. The workshop’s papers were published in AAAI Technical Report WS-15-22 and are available in the AAAI Digital Library.

### Player Modeling

The primary focus of the Player Modeling workshop was on the use of CI/AI for understanding players, their actions, decisions, plans, intentions, and their cognitive and behavioural as well as affective mani-

festations. CI/AI can also be used for capturing, modeling, and optimizing the player’s experience during game play. We argue that the ultimate direct and indirect use of player models is to assess and enhance player experience. On this basis, this workshop attempts to encourage a dialogue among researchers in the AI, human-computer interaction, game design, cognitive modeling, affective computing and psychology disciplines who investigate dissimilar methodologies for improving user (player) experiences.

The workshop was organized by Noor Shaker (IT University of Copenhagen, Denmark); Georgios Yannakakis (University of Malta, Malta); and Pieter Spronck (Tilburg University, The Netherlands). No report of the workshop was submitted to *AI Magazine*.

### Notes

1. The current version can be found at [bitbucket.org/auriar/starcraftbenchmarkai](http://bitbucket.org/auriar/starcraftbenchmarkai).

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