



Artificial Intelligence and Interactive Digital Entertainment

Program

The Sixth AAAI Conference on
Artificial Intelligence and
Interactive Digital Entertainment
(AIIDE-10)

October 11–13, 2010

Stanford University
Stanford, California USA

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R. Michael Young (North Carolina State University, USA)

A complete listing of the AIIDE-10 Program Committee members appears in the conference proceedings.

Opening Reception

The AIIDE-10 Opening Reception will be held Monday, October 11, 6:00 – 8:00 pm in the Gold Lounge of the Stanford Faculty Club. Heavy hors d'oeuvres will be served, and hosted beer, wine, and soft drinks will also be available. Admittance to the reception is free to AIIDE-10 registrants. A \$35.00 per person fee (\$10.00 for children) will be charged for spouses and other nontechnical conference registrants.

Poster / Demo Session

The AIIDE-10 Poster / Demo Session will be held on Tuesday, October 12, 4:30 – 7:30 pm, in the Oak Lounge of Tresidder Union. Light refreshments will be served. The complete program is available in the schedule that follows.

AIIDE-10 Technical Program

All AIIDE-10 sessions will be held in Oak Lounge, Tresidder Union.

Monday, October 11

8:45 – 9:00 AM

Welcome and Introduction

Michael Youngblood and Vadim Bulitko, AIIDE Conference and Program Chairs

9:00 – 10:00 AM

Invited Talk

*Chris Jurney (Lead Programmer, Double Fine Productions)
Introduction by Michael Youngblood*

Chris Jurney is a rock and roll experimental game programmer at Double Fine Productions, with 11 years experience in games and simulation. He has shipped 4 titles in the games industry: *Company of Heroes*, *Frontline: Fuel of War*, *Dawn of War 2*, and *Brutal Legend*. Jurney frequently speaks on the topic of game AI, having presented at the Game Developers Conference (GDC), GDC China, Columbia University, the University of Pennsylvania, and the New Jersey and Philadelphia chapters of the International Game Developers Association (IGDA). He has also written two articles published in *AI Game Programming Wisdom 4* and wears tin foil weaved into his hair to block the voices.

10:00 – 10:30 AM

Coffee Break

10:30 AM – 12:00 PM

Session: Behaviors

Chair: Michael Buro

Perceptually Realistic Behavior through Alibi Generation

Ben Sunshine-Hill, Norman I. Badler

Applying Goal-Driven Autonomy to StarCraft

Ben G. Weber, Michael Mateas, Arnav Jhala

AI for Herding Sheep (Industry)

Peter Cowling, Christian Gmeinwieser

12:00 – 1:30 PM

Lunch Break

(restaurant list available in registration)

Lunch Meeting

Game AI Journal Discussion (12:30 PM start, no-host lunch, pre-order)

1:30 – 2:30 PM

Invited Talk

A Perspective on the Use of Digital Media and AI in Serious Games and Training

*Bob Sottolare (U.S. Army Simulation and Training Technology Center)
Introduction by Mark Riedl*

This talk will provide a perspective on the role of artificial intelligence (AI) and interactive digital media in serious games and training applications for the military. The perspective will focus primarily on non-kinetic training (e.g. bilateral negotiation, medical training and exercising decision making in ill-defined environments). The importance of intelligent agents in enhancing military training, leader development and education (TLE) and in reducing associated support costs will be discussed along with the use intelligent agents to supplement individual and collective training experiences where human support is limited, impractical or completely unavailable. Challenges in the development of adaptive, interactive media for training will also be discussed.

Bob Sottolare is the chief technology officer at the U.S. Army Simulation & Training Technology Center (STTC) in Orlando, Florida. His recent publications have appeared in the *Journal for Defense Modeling and Simulation*, the NATO workshop on Human Dimensions in Embedded Virtual Simulation and the Intelligent Tutoring Systems Conference. He has a doctorate in modeling and simulation from the Uni-

Monday

versity of Central Florida and the focus of his current research program is in machine learning, trainee modeling, and the application of artificial intelligence tools and methods to adaptable training environments for Warfighters.

2:30 – 3:30 PM

Session: Learning I

Chair: Lisa Torrey

Learning Companion Behaviors Using Reinforcement Learning in Games

AmirAli Sharifi, Richard Zhao, Duane Szafron

Training Goal Recognition Online from Low-Level Inputs in an Action-Adventure Game

Kevin Gold

3:30 – 4:00 PM

Coffee Break

4:00 – 5:30 PM

Session: Content Generation

Chair: Brian Schwab

Towards Automatic Personalized Content Generation for Platform Games

Noor Shaker, Georgios Yannakakis, Julian Togelius

A Semantic Scene Description Language for Procedural Layout Solving Problems

Tim Tuteneel, Ruben M. Smelik, Rafael Bidarra, Klaas Jan de Kraker

Using Machine Translation to Convert between Difficulties in Rhythm Games

Kevin Gold, Alexandra Olivier

6:00 – 8:00 PM

AIIDE-10 Opening Reception

Faculty Club, Stanford University

Tuesday, October 12

9:00 – 10:00 AM

Invited Talk

Cracks in the Fourth Wall: Digging into a Humanistic Phenomenon Using Computational Models

R. Michael Young (North Carolina State University)

Introduction by Arnav Jhala

Research on computational approaches to narrative push the boundaries on a diverse set of techniques, ranging from planning to constraint solving to machine learning and more. At the core of the area, though, lies narrative itself. Narrative holds a position of privilege in our minds, being a fundamental mode of understanding the worlds around us. In this talk, Young will describe a trajectory of projects from his research group and the role that the nature of narrative and its comprehension by people has played in setting their goals and the methods they use to achieve them.

R. Michael Young is an associate professor of computer science at North Carolina State University, where he leads the Liquid Narrative Research Group. His work focuses on the computational modeling of interactive narrative. Michael received an NSF CAREER Award in 2000 and has received university-level awards for outstanding teaching and outstanding activities in engagement/economic development. He was a co-founder of AIIDE and served as its first conference chair. Young was editor-in-chief of the *Journal of Game Development* from 2007 to 2008. He serves as an associate editor of the IEEE journal *Transaction on Computational Intelligence and AI in Games*.

10:00 – 10:30 AM

Coffee Break

10:30 AM – 12:00 PM

Session: Interactive Narrative

Chair: Arnav Jhala

An Offline Planning Approach to Game Plotline Adaptation

Boyang Li, Mark O. Riedl

Modeling User Knowledge with Dynamic Bayesian Networks in Interactive Narrative Environments

Jonathan P. Rowe, James C. Lester

Story and Text Generation through Computational Analogy in the Riu System

Santiago Ontañón, Jichen Zhu

12:00 – 1:30 PM

Lunch Break

1:30 – 2:30 PM

Invited Talk

Chris Hecker (Spy Party)

Introduction by G. Michael Youngblood

Chris Hecker focuses on solving hard problems at the intersection of gameplay, aesthetics, and technology. He is an outspoken advocate for pushing the current boundaries of design and interactivity, in the hope that games will eventually achieve their full potential as a medium. To this end he helps organize the Indie Game Jam and the Experimental Gameplay Workshop, and his recent work has centered on using proceduralism and artificial intelligence to enhance player creativity and agency. Hecker has been on the advisory board for the Game Developers Conference for many years and is a regular speaker at the GDC, SIGGRAPH, and other conferences. A frequent contributor to *Game Developer* magazine, Hecker was the technical columnist for the magazine for two years and the editor-at-large for three, and is currently on the editorial board of the computer graphics research publication, *The Journal of Graphics Tools*. He has worked at both ends of the development spectrum, as a one-man indie game developer with his company definition six, inc. and on a hundred-person team at Maxis/Electronic Arts. His professional goal is to help games become the preeminent art and entertainment form of the 21st century. His current project is SpyParty, an indie game about subtle human behavior and deception.

Tuesday

2:30 – 3:30 PM

Session: Learning II

Chair: Duane Szafron

An Automated Technique for Drafting Territories in the Board Game Risk

Richard Gibson, Neesha Desai, Richard Zhao

Crowd Simulation via Multi-Agent Reinforcement Learning

Lisa Torrey

3:30 – 4:00 PM

Coffee Break

4:00 – 4:30 PM

AIIDE-10 Poster/Demo Session Set-Up

Oak Lounge, Tresidder Union, Stanford University

4:30 – 7:30 PM

AIIDE-10 Poster/Demo Session

Oak Lounge, Tresidder Union, Stanford University

Posters

On the Complexity of Two-Player Attrition Games Played on Graphs

Timothy Furtak, Michael Buro

Adversarial Navigation Mesh Alteration

D. Hunter Hale, G. Michael Youngblood

A Non-Modal Approach to Integrating Dialogue and Action

Philip Hanson, Charles Rich

Multi-Agent Coordination Using Dynamic Behavior-Based Subsumption

Frederick W. P. Heckel, G. Michael Youngblood

Polymorph: A Model for Dynamic Level Generation

Martin Jennings-Teats, Gillian Smith, Noah Wardrip-Fruin

A Command Language for Taskable Virtual Agents

Pat Langley, Nishant Trivedi, Matt Banister

A Monte Carlo Approach for Football Play Generation

Kennard Laviers, Gita Sukthankar

Fuzzy Micro-Agents for Interactive Narrative

Brian Magerko, Casey Fiesler, Allan Baumer

Behavior Compilation for AI in Games

Jeff Orkin, Tynan Smith, Deb Roy

Terrain Analysis in Real-Time Strategy Games: An Integrated Approach to Choke Point Detection and Region Decomposition

Luke Perkins

Novice-Friendly Authoring of Plan-Based Interactive Storyboards

James Skorupski, Michael Mateas

Player Modeling in Civilization IV

Pieter Spronck, Freek den Teuling

An Automated Model-Based Adaptive Architecture in Modern Games

Chek Tien Tan, Ho-lun Cheng

Minstrel Remixed: Procedurally Generating Stories

Brandon Tearse, Noah Wardrip-Fruin, Michael Mateas

Socially Consistent Characters in Player-Specific Stories

David Thue, Vadim Bulitko, Marcia Spetch, Michael Webb

Quest Patterns for Story-Based Computer Games

Marcus Trenton, Duane Szafron, Joshua Friesen, Curis Onuczko

Modeling Narrative Conflict to Generate Interesting Stories

Stephen G. Ware, R. Michael Young

Designing a Massively Multiplayer Online Game / Research Testbed Featuring AI-Driven NPC Communities (Industry)

Michael Zyda, Marc Spraragen, Balakrishnan Ranganathan, Bjarni Arnason, Peter Landwehr

Demonstrations

WeQuest: A Mobile Alternate Reality Gaming Platform and Intelligent End-User Authoring Tool

Chinmay Barve, Sanjeet Hajarnis, Devika Karnik, Mark O. Riedl (School of Interactive Computing, Georgia Institute of Technology)

Alternate reality games (ARGs) are interactive narratives that layer a fictional story world on top of a real world. Players move about the real world in order to progress through a storyline. ARGs are limited by their dependency on a human puppetmaster and on references to specific locations and landmarks. We present *WeQuest*, a suite of technologies to overcome limitations of ARGs through intelligent tools for end-user authoring of location-specific ARG storylines.

The Pataphysic Institute

Mirjam P. Eladhari (Gotland University)

Pataphysic Institute (PI) is a research prototype multi-player game world. In *PI*, the personalities of the inhabitants are the base for the game mechanics. When interacting with other characters the potential emotional reactions depend upon avatars' current mood and personality. *PI* is built with inspiration from personality psychology and affect theory in an attempt to mimic possible emotional responses in order to give the player support in role-playing. The mental states of characters depend on their personalities and on their current moods. Moods differ according to context and to recent experiences. Emotional experiences become memories and define the relationships between characters. The mental state is the sum of the character and governs what actions can be performed in a given moment. In order to do certain things the characters need to be in certain moods — and for this the players need to game their avatars' emotions, and game their relationships.

The Prom: An Example of Socially-Oriented Gameplay

Joshua McCoy, Mike Treanor, Ben Samuel, Brandon Tearse, Michael Mateas, Noah Wardrip-Fruin (University of California, Santa Cruz)

The Prom is a game where the player manages the social life of a group of high school students and creates the situations from which dramatic, thought provoking or at least funny stories can unfold. The setting of *The Prom* involves a group of alternative high school kids (for example, Emos, Goths, Geeks, and so on) and their dramatic lives as they prepare for the upcoming school prom. Through creating friendships, making people become enemies, controlling who gets to be in the "in" crowd and much more, the player can shape the social world of the characters. Each character has a distinct personality represented by interests (for example, what bands they like), needs (for example, a character may need to demonstrate a certain degree of dominance over others), traits (for example, being a particularly jealous person), social networks (for example, to what degree a characters like, are attracted to or respect one another) and social status (for example, who is dating who). *The Prom* is a playable prototype of a game play experience with a focus on involving the player in the social aspects of the game world. The artificial intelligence system, *Comme il Faut*, is used by *The Prom* to enable this type of social game play while providing an abstraction of patterns of social interactions, known as social games, which serve to ease the burden of authoring complex social interactions with respect to the specific personalities of characters.

Tanagra: An Intelligent Level Design Assistant for 2D Platformers

Gillian Smith, Jim Whitehead, Michael Mateas (Expressive Intelligence Studio, University of California Santa Cruz)

We present a demonstration of Tanagra, an intelligent level design assistant for 2D platformers. Tanagra integrates reactive planning and constraint programming to automatically generate levels and respond to designer changes in realtime. A reactive planning language, ABL, allows us to easily express hierarchical patterns of level geometry, from simple patterns such as a jump over a gap, to more complex patterns such as staircases and pits. A model of player movement and constraints within and between geometry components ensure that the levels created by our system are always playable.

Rapid Development of Characters in FPS/3PS Games Using Visually-Specified Behavior-Based Control

G. Michael Youngblood, Frederick W. P. Heckel, D. Hunter Hale, Arthur Carroll (University of North Carolina at Charlotte)

First/third-person simulations in virtual environments have become increasingly used in training; however, creating intelligent virtual characters to populate these environments presents a large authorial burden. Our work focuses on building tools to enable rapid creation of intelligent characters for first/third-person game-like environments that enable users with no programming knowledge to develop interactive characters. This is made possible using an intuitive agent architecture known as behavior-based control combined with a user interface employing natural language-like specification and interactive testing during character development.

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Technical Report WS-04-04. ISBN 1-57735-205-x. 154 pp., \$30.00

A limited number of copies of these reports are available at
www.aaai.org/Press/Reports.

Wednesday, October 13

Wednesday

9:00 – 10:00 AM

Invited Talk

Learning to Make Music: Interactive AI for Music Creation

Sumit Basu (Microsoft Research)

Introduction by Mark Riedl

For those who can play an instrument or have a respectable singing voice, music can be a wonderful means of creative expression, social engagement, and fun. For many others, though, it can be frustrating and inaccessible: even if an inspired youth has great musical ideas, she may not have the knowledge or ability to get her latest song out from her head and into her MP3 player. In this talk, Basu will show three vignettes of how he and his colleagues have used interactive machine learning to extend the creative reach of aspiring musicians: a system that adds a learned notion of style to dull MIDI sequences, a system for interactively creating accompanying chord sequences from a melody input, and a method for helping singers produce the notes they meant to sing. Finally, making music more accessible also makes it more fun, for both novices and experts. Basu will end his talk with some thoughts on how these technologies might lead to interesting gaming experiences.

Sumit Basu has been a researcher at Microsoft Research since completing his PhD at the Massachusetts Institute of Technology in 2002. His primary focus area is interactive machine learning, within which he investigates how human judgments, knowledge, and intent can best be leveraged to train or guide complex learning algorithms, as well as how algorithmic approaches can be used to teach humans new information. He has worked in a variety of application areas for this technology, including music creation and analysis, data mining and organization, diagnosing computer systems, and speech/conversational analysis. More information including publications, projects, videos, and released software is available from Basu's website (research.microsoft.com/~sumitb).

10:00 – 10:30 AM

Coffee Break

10:30 – 11:00 AM

StarCraft Competition Results Announcement

The StarCraft AI competition enabled researchers to evaluate their systems in a commercial real-time strategy game. Participants were given the task of building the best performing bot for StarCraft: Brood War, which was released by Blizzard Entertainment in 1998. The goals of the competition were to provide a testbed for AI and to promote game AI research by exhibiting techniques in an immensely popular game. The competition consisted of four tournaments, offering a range of complexity. The first tournament focused on micromanagement in flat-terrain environments. The second tournament built on the first by adding interesting terrain. The third tournament evaluated bots in a simplified StarCraft scenario, in which perfect information is available and only a subset of the unit types can be produced. The fourth tournament evaluated bots in full-blown StarCraft games, simulating the environment faced by professional gamers. In each tournament, bots were paired up in one-on-one matches with the objective of destroying all enemy forces. All the tournaments utilized a best of five, double-elimination bracket. The rule set was based on the ORTS 2009 competition, but relaxed the rules to enable the development of bots in a variety of programming languages including Java, C#, Lisp and Python. (eis.ucsc.edu/StarCraftAICompetition)

11:00 AM – 12:00 PM

Session: Pathfinding I

Chair: Chris Darken

A Comparison of High-Level Approaches for Speeding Up Pathfinding

Nathan R. Sturtevant, Robert Geisberger

DHPA* and SHPA*: Efficient Hierarchical Pathfinding in Dynamic and Static Game Worlds

Alex Kring, Alex J. Champandard, Nick Samarín

Wednesday

12:00 – 1:30 PM

Lunch Break

(restaurant list available in registration)

Lunch Meeting

AIIDE 2011 Planning Meeting (12:30 start, no-host lunch, pre-order)

1:30 – 2:30 PM

Game AI Education Panel

Mark Riedl (moderator), John Funge, Brian Magerko, Charles Rich, Julian Togelius

2:30 – 3:30 PM

Session: Pathfinding II

Chair: Michael Young

Breaking Path Symmetries in 4-Connected Grid Maps

Daniel Harabor, Adi Botea

Realistic Fireteam Movement in Urban Environments

Christian J. Darken, Daniel McCue, Michael Guerrero

3:30 – 4:00 PM

Closing Remarks

Michael Youngblood and Vadim Bulitko

General Information

Banking

Wells Fargo Bank is located on 459 Lagunita Drive in the Tresidder Building. It is open 8:00 AM – 5:00 PM, Monday through Friday.

A Bank of America ATM machine is located in Tresidder Building, Room 214.

Internet Access

Please note that there will be no internet room organized by the conference. For those people with their own laptop computers, complimentary high-speed internet access will be available to AIIDE-10 registrants in Tresidder Union. Details about how to take advantage of this offer will be available at the onsite registration desk.

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