SERVICE

GATE

Game research
for training and
entertainment

The GATE research theme Virtual Characters deals with the creation of realistic behavior for the virtual characters that inhabit the virtual worlds and games. These can be either avatar representations of the users or computer-controlled characters. Such realistic behavior is important to increase the immersion of players in the game world.

For example, we investigated the effects of both vertical and horizontal Field of View restriction on maneuvering performance and head movement while traversing an obstacle course consisting of three different types of obstacles. A restriction of both the horizontal and vertical angle of the visual field resulted in increased time needed to traverse the course. In addition, the extent of head movement during traversal was affected by vertical, but not horizontal viewing restriction. We also found that performance could not be improved by altering the orientation of the visual field instead of its dimensions.

In addition to modeling motor behavior, we also want to model the cognitive behavior of virtual characters. One of the main criteria of training simulations or serious games in general is the fact that all elements in the scenario need to be as realistic as possible. This entails that the virtual agents in the system need to be believable and perform behavior appropriate to the situation in the game. In order to create believable agents, that perform the role of virtual humans in the system, we investigate the workings of cognitive processes in humans and how those can be simulated by agents. More specifically we look at: How can cognitive states be formally represented and how do they

relate to the generation, selection and execution of behavior of the agent. In this work-package agent behavior is taken to include (but is not limited to) verbal and non-verbal communication and social behaviors in general.

Apart from modeling behavior, we also want to synthesize the motion of virtual characters. One of the basic operations that virtual characters must perform is navigating from their current location in the virtual world to a desired new location. Often multiple characters move in large groups or crowds in the same environment. Path planning and crowd simulation play an important role in the immersion that a player experiences. Although path finding has been extensively studied over the past years, traditional techniques have mainly focused on creating collision-free and short paths, rather than on creating natural paths. Existing real-time crowd simulation approaches also fail to deliver motions that are realistic or at least convincing to the viewer. We invent new, practical path planning and crowd simulation algorithms that generate convincing paths in real time.

In all these cases, further innovation is needed. More insight into how to model behavior, and new methods to synthesize actions of virtual characters are necessary to push the frontiers of the state of the art in modeling virtual characters. The GATE project goes on.

Remco Veltkamp *Utrecht University*

Creative Game Challenge

The Creative Game Challenge is a game-making contest for high school students. Its purpose is to improve the interest in different aspects of computer science and in a computer science education. The contest is organized by Roland Geraerts, an assistant professor who teaches Game technology at Utrecht University. During this contest, the students are provided a free license for YoYo Games' Game Maker engine and are asked to build a water-themed game. Through newsletters, interactive discussions, websites, forums, and social networks, the students are motivated to participate and to continually improve their game.
This year, a total of 264 teams registered for the event, and these teams produced 113 games. The members of the Dutch Game Development and Research Club (DGDARC) are currently preparing a nomination of the 20 best games. These games will be transferred to an independent jury composed of Michaël Bas, Arjan Brussee, Zuraida Buter, Juney Dijkstra, Jan-Pieter van Seventer, and Marlies Wijnen. They will assign nine prizes (7,500 euro) to these games based on criteria such as playability, design, and connection to the theme. The final event will take place at De Uithof in Utrecht on June 24. Besides awarding the prizes, which is carried out by our special guest Erik Hulzebosch, there will be several gaming activities, including dancing on many dance pads, Kinect gaming, 3D gaming, and student demos. All members and coaches of the nominated teams will receive a nice present from Microsoft. While the submission of games has been closed, the contest will be organized again next year thanks to the financial support of the CAICT organization.

http://www.creativegamechallenge.nl

Social interaction in gaming needs non verbal behavior sensing and generation.

Non-verbal Continuous Interaction for Games and Training

Human Interaction in Gaming is becoming more and more important. New sensing devices like the Kinect are going enable verbal as well as non-verbal continuous interaction in gaming and simulation for training.

Interaction between real and virtual humans in is becoming more interesting. In a classical 3D game, interaction is severely limited: you, the user, can see the virtual humans, but they cannot see you. As a consequence, a whole communication channel, that of non-verbal communication, is completely neglected, thus far. But new enabling technology for sensing body posture and gestures, like the Kinect, is becoming available. Potentially, the virtual humans can now see you too! But a sensing device is only the first step. A challenge is how to interpret such non-verbal behavior as social signals. And the next major step is how virtual humans should react, using similar non-verbal behavior.

Human Interaction in Games
In traditional 3D games and VR applications, interaction via, body posture, gesturing, or other non-verbal behavior is hampered. There are many applications and games where this won't do. Think of police training in the form of a serious game: handling challenging social situations asks for good social skills and good interaction techniques. It is not just what you say, but also how you say it. For instance, what gestures do you use, what is your body language are all equally important. Fortunately, technology for sensing body posture and gestures is becoming available, both for the professional market

in the form of suits with motion tracking as well as for the consumer market with much more affordable devices like the Kinect. Of course knowing the physical body pose of a human is not enough: the next real challenges are how to interpret such non-verbal behavior as social signals, and how virtual humans should react, using similar generated non-verbal behavior.

Continuous Interaction
Interpreting as well as generating multimodal behavior for virtual humans is a core business for the Human Media Interaction group at the University of Twente. Within the Gate project we focus on 'Continuous Interactive Embodied Agents (ECA)' who can deal actively with responses and interruptions from a human counterparts. So, interaction is not necessarily `turn based', but rather allows for constant interaction. For instance, you could ``backchannel'' to your communication partner by nodding, or by looking in a particular direction, while he is speaking. Or you might even interrupt him. In the latter case we expect the virtual human to deal with it in a graceful way.

eNTERFACE'10
Last summer, several GATE-PhD students and postdocs participated in the eNTERFACE'10 workshop, that was held in Amsterdam. During four weeks they worked on a 'continuous interactive Embodied Conversational Agent (ECA)' in the form of a tourist guide who can deal actively with

responses and interruptions from the user. In order to create rapport and to check whether the user was still understanding and following the ECA, several feedback elicitation techniques were built in. For instance, prosodic (pitch contour, pauses) and gaze behavior were adjusted (based on findings in the literature) in such a way that it would invite users to give feedback. In order to deal with cooperative feedback (e.g., backchannels) and interruptions (e.g., 'barge-ins', 'wait wait I don't understand'), online classifiers were developed to decide whether the ECA should stop talking when the user begins to speak while the ECA is still speaking.

Elckerlyc
Our open source behavior realizer Elckerlyc (http://hmi.ewi.utwente.nl/showcase/Elckerlyc) is specifically designed to steer ECAs in very flexible manner, so that continuous interaction is potentially allowed. Experiments with this setup are ongoing. For more information on eNTERFACE'10 and our project, see (http://enterface10.science.uva.nl/) where you can also find tutorials and keynote presentations given at the workshop.

The work on continuous interaction by the Human Media Interaction group is done within the ``Virtual Characters'' theme of the Gate project. The persons involved are Herwin van Welbergen (PhD student), Dennis Reidsma (Postdoc) and Job Zwiers.

Job Zwiers is associate professor at the Human Media Interaction group of the department of Computer Science of the University of Twente. He has a background in physics and theoretical computer science, and verification of distributed systems. His current interests are in the fields of human computer interaction, computer graphics, multi agent Systems, and ambient intelligence. He participated in European projects AMI, Mesh, Amida, and in the AgentLink network of excellence. He is currently active within the European projects Metaverse, the Dutch Gate project, and the just started Commit project, related to interaction in virtual reality environments.