GATE Thema II: Virtual Characters

Crowd Behavior

Cognitive Behavior

Motor Behavior

Trend: Virtual characters become more autonomous and goal-directed rather than scripted only

State of the art in Virtual Characters
> Motor Behavior

› Virtual characters increasingly display realistic body movements – but lack adequate models to control these movements in-situ

› Virtual characters are gaining means of expression and interaction but lack adequate models to control these in a natural way

State of the art in Virtual Characters
> Cognitive Behavior

› Virtual characters are often uniform flat characters – they do not have emotions nor personality traits

› Virtual characters are often unaware of their environment - they do not recognize bodily or social behavior

› Virtual characters are often modeled in isolation from others – they do not have capabilities to interact with others, e.g. they do not have emotional, social, team or instructional intelligence

State of the art in Virtual Characters
> Crowd Behavior

› General path planning frameworks only exist for individual virtual characters – no general framework for planning motions of crowds exists

› Path planning frequently takes place in 2D – it neglects the 3D nature of obstacles

Impact of results of the past five years of GATE research on applications
> Motor Behavior

› Virtual characters can display realistic movements in situ
(*WP2.1: Simulating human movement*)

› Virtual characters can interact with users in a continuous and multi-modal way
(*WP2.1: Continuous Interactive dialogs with Embodies Conversational Agents*)

Impact of results of the past five years of GATE research on applications
> Cognitive Behavior

❯ Virtual characters can give elementary explanations of their behavior

 (*WP2.2: Explaining Virtual Character Behavior*)

❯ Virtual characters can extract an interpretation of intention from

 players' behavior

 (*WP2.2: Mindreading Virtual Characters*)

❯ Virtual characters will be able to have emotions

 (*WP2.2: Social Virtual Characters*)

Impact of results of the past five years of GATE research on applications
> Crowd Behavior

› Virtual characters are able to move as a crowd in a visually convincing way

(*WP2.3: Virtual Crowds*)

Impact during the coming five years

› General: Adoption of GATE results by (serious) gaming industry, incorporation into next-generation products

› Motor Behavior:

  › Application of the Continuous Interaction concept and technology within projects (e.g. the Dutch Commit project (generation of social signals), or the EU Smarcos project).

  › More realistic manoeuvring and collision avoidance behavior in complex environments

Impact during the coming five years

› Cognitive Behavior:

› Making virtual characters more believable to the player by increasing their cognitive abilities and enabling intuitive interaction

› Designing control mechanisms that direct the behavior of virtual characters to the benefit of training

› Crowd Behavior:

› Integration of results into simulations of evacuations and pedestrian flows to enhance realism, immersion, and/or learning experience

› Evolution of current solutions to larger crowds, 3D obstacles, and improved realism of interaction between characters

Challenges for the coming ten years

› Virtual characters that:

  › have and display emotions and personality traits

  › display social and collaborative behavior

  › interact in a believable way with humans by showing integrated cognitive and bodily behavior

  › interact in an intuitive way with humans by an enhanced level of freedom for interactions, both for the content as for the mode of interaction

  › have advanced instructional facilities

  › have advanced task-support facilities

  › can function in mixed-reality settings

› **Evaluation of virtual characters**

Game research
for training and
entertainment

GATE Vision Meeting Thema II

TNO innovation
for life

Impact of solutions to the challenges

› Improved learning and task performance of humans because:

  › Humans better understand virtual character behavior

  › Humans can interact more naturally with virtual characters

  › Humans trust virtual characters more

  › Virtual characters display behavior supportive of training

› Improved human interaction with systems because:

  › Virtual characters function as intelligent interfaces

  › Virtual characters increase enjoyment and trust

› Improved development process because:

  › Generic frameworks exist for developing models of motor, cognitive and crowd behavior

  › Standards exist for integrating these models into virtual environments

› Improved acceptance of virtual characters because:

  › Evidence exist that virtual characters enhance learning and task performance

Main players in the Netherlands and abroad

› Companies

  › Serious game companies: Ranj (NL), Vstep (NL), E-semble (NL), …

  › Crowd behavior companies: Legion (UK), Golaem (F), …

› Research Institutes

  › Institute for creative technologies (USC at LA), TNO (NL), INRIA Rennes (F), …

› Universities

  › Utrecht University (NL), Twente University (NL), Trinity College Dublin (IRL), University of Cyprus, UNC Chapel Hill (USA), UCLA (USA), …