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Visualization techniques for crowd simulation

Leonel Antonio Toledo Díaz
Instituto Teconologico de Estudios Superiores de Monterrey, México

Large scale agent-based simulation is an expensive task in terms of resources and processing power, in order to have convincing simulations developers are faced with a trade-off between the level in the representation of each agent and the scalability seen as the number of agents that can be simulated with the computing resources available. Real-time crowd simulation brings different challenges when compared with the systems either involving a small number of interactive characters (for example, the majority of contemporary computer games), or non-real-time applications (as crowds seen in movies, or visualizations of crowd evacuations after off-line model computations). Virtual agents, which can be regarded as humans or any given mesh, should look different, move different, react and sound different. Even if assuming perfect simulation of a single virtual agent would be possible, creating a simulation that involves multiple such agents would be still a difficult and tedious task. In order to create complex virtual-reality environment many constraints must be satisfied, for instance, variety, animation, visualization and rendering are some of the challenges that must be addressed. For computer games to run at interactive frame rates (at least 30-frames-per second) many optimizations must be applied to enhance the quality of the visualizations. However, computer games are not the only interactive applications that can benefit from this approach, for instance marketing, safety, virtual prototying, cultural heritage, medical treatment, urban planning and many more fields can benefit from this visualization techniques and optimizations.

Biography

Leonel Toledo received his PhD from Instituto Tecnológico de Estudios Superiores de Monterrey Campus Estado de México in 2014, where he currently is a full-time professor. From 2012 to 2014 he was an assistant professor and researcher. He has devoted most of his research work to crowd simulation and visualization optimization. He has worked at the Barcelona Supercomputing Center using general purpose graphics processors for high performance graphics. His thesis work was in Level of detail used to create varied animated crowds. His research interests include crowd simulation, animation, visualization and high-performance computing and HCI.

ltoledo@itesm.mx

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