

# GERMAN AI SOLUTION FOR GAMES

AN AI SOLUTION BREAD FROM A GERMANY COMPANY CALLED XAITMENT IS READY TO SHIP INTERNATIONALLY. THIS IS WHAT THE CREATORS HAVE TO SAY ABOUT THEIR OWN PRODUCT.

TEXT + ILLUSTRATIONEN: XAITMNET

## Intelligent Games

Games are becoming more complex. Better hardware is pushing the boundaries of what is possible. Improved graphics are immersing players with a heightened sense of realism. More complex graphics systems, physics engines and level editors are ensuring that players are getting the most out of their gameplay experience. Yet, one critical area remains sorely lacking: the artificial intelligence (AI) of computer-controlled enemies and non-player characters (NPCs), or agents.

Just what is artificial intelligence? The modern definition of artificial intelligence is "the study and design of intelligent agents". An intelligent agent is a system that perceives its environment and takes actions which maximize its chances of success. While the study of artificial intelligence began in the summer of 1956, it took nearly two decades for games to start using it.

The first games to show any enemy intelligence appeared in the late 1970s. While still raw in form, the enemies in *Space Invaders*, for example, displayed increasing levels of difficulty and distinct movement patterns. This was an important

step in game development. Suddenly, enemies were able to react based on player actions, a feature which improved the difficulty and realism of the game.

Yet, some would argue that the implementation of game artificial intelligence has lagged behind the development of other game development tools. While new AI features continue to emerge, most solutions are still "one-size-fits-all" solutions. These all-inclusive technologies are usually time-consuming to implement, burdensome to the development process and force studios to purchase some tools they may never use.

There is one solution, however, that is bucking that trend: the xait-Engine.

## Intelligent Agent Movement & Decision Making

Intelligent movement and decision making are the foundation for creating more autonomous agents and for building dynamic team formations, emotional intelligence and lifelike characters.

Intelligent movement is not pathfinding. Pathfinding is the process of determining a route from

point A to point B in a game. It is usually accomplished through automatic or manual placement of waypoints, or points of interest, that direct the agents to, for example, tactically advantageous positions throughout an environment. But this technique is not applicable for moving the agents around in a dynamic environment. Pathfinding only hints at where to go; it does not describe how to move the agent from point A to point B. A path only guarantees that an agent can get from one position to another. To avoid dynamic objects such as other non-player characters (NPCs) or players, dropped boxes and the like, more sophisticated algorithms are needed to produce a complex, and intelligent, movement behavior. A process called "dynamic avoidance" ensures that agents are not tripping over objects they should be walking around.

In addition, agents are usually called upon to make decisions. With traditional game AI solutions, these decision making processes have been relatively limited, and have focused primarily on determining an agent's reaction to a certain input, such as an explosion, an attack and a team-based movement.

One company – xaitment – has not only improved upon these traditional features; they are offering them in a completely new, and completely modular, way.

**xaitment: Beyond Pathfinding**  
xaitment GmbH was founded by Dr. Andreas Gerber, a research scientist and software developer from the German Research Center for Artificial Intelligence (DFKI). Applying his knowledge from DFKI, Dr. Andreas Gerber set out to engineer "lifelike Artificial Intelligence (AI) for computer games and simulations". His mission: create AI that is so realistic, players will not be able to determine whether they are playing against other human players or against computer-controlled agents.

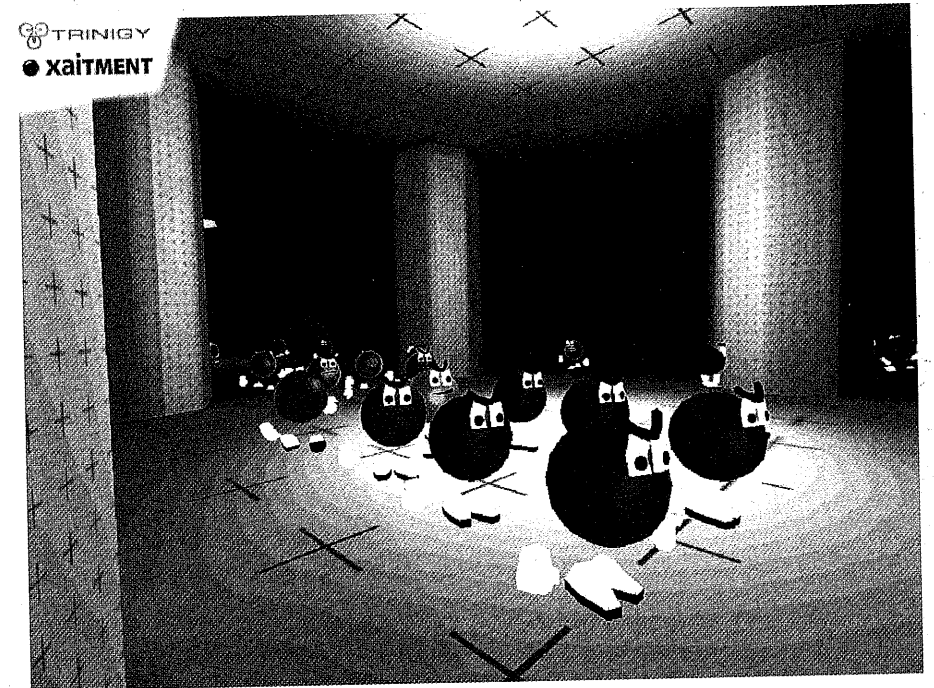
Dr. Gerber's solution, the xait-Engine, suffuses today's game AI with realistic influences, such as basic reactions, goals, rewards, consequences and even emotions. What's more, game developers can either purchase the xait-Engine as a whole or choose one of its four AI modules. The flexibility, cost-effectiveness and ease of integration that result from this modular approach appeal to game developers of all sizes.

"We have always envisioned an AI solution that gives studios the most advanced artificial intelligence with the greatest flexibility," said Dr. Andreas Gerber, Group-CEO of xaitment. "The xait-Engine and its associated modules do just that."

## Realistic Decisions

One of the central themes of xaitment's solution is the idea of autonomous agent behavior. With xaitment's solution, the ability to infuse autonomous behavior in agents allows developers to create characters who more closely mirror actual humans. This, in turn, provides the level of realism needed to completely immerse players in the game world.

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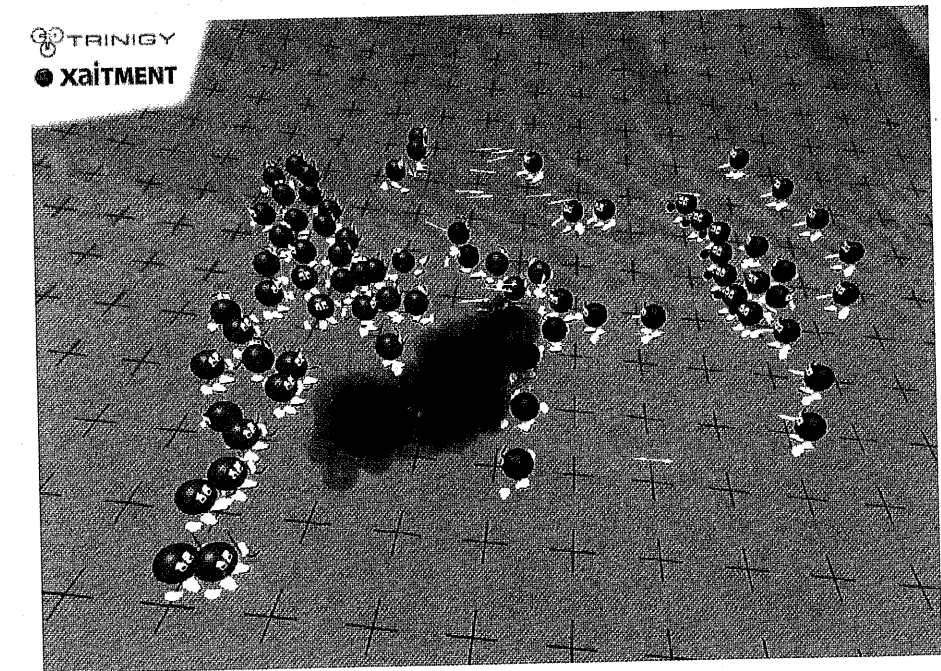


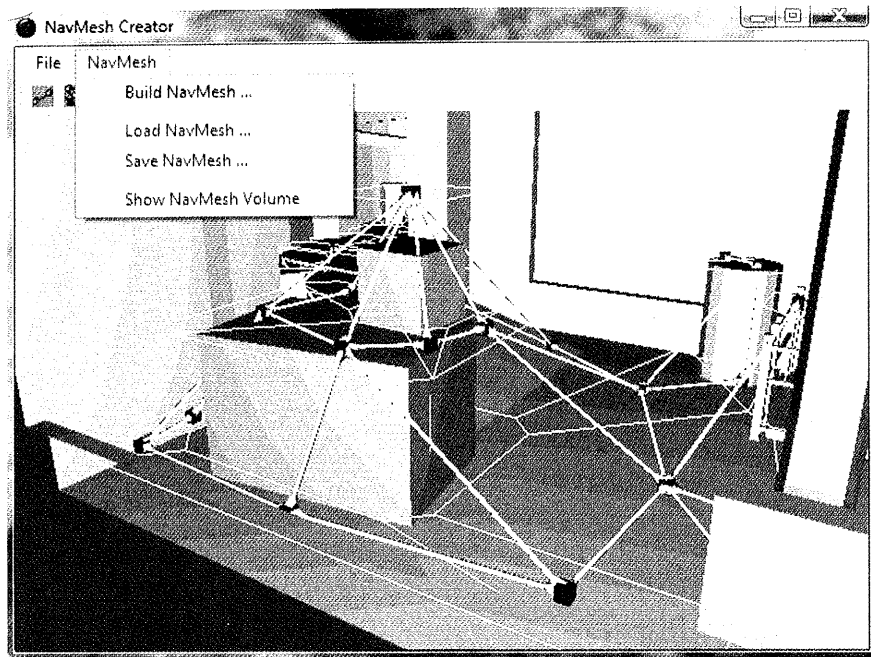
xaitment's behavior module helps developers create more realistic behaviors for agents in both familiar and unfamiliar situations. The module incorporates various systems to achieve that realism. The first system enables agents to learn by inference, i.e. to infer that something is true based on other influences in the game world. A reactive system determines how agents react based on specific events and adjusts their behavior to the current situation in the game. By using of AI-

planning system, the agents can develop script-like plans for a given problem based on their known rules and their individual knowledge. In this way, every agent can come up with a unique plan given its previous experiences. These realistic behaviors make more interactive gameplay possible.

xaitment also provides a hierarchical, probabilistic Finite State Machine (FSM) module with an intuitive graphical user interface.

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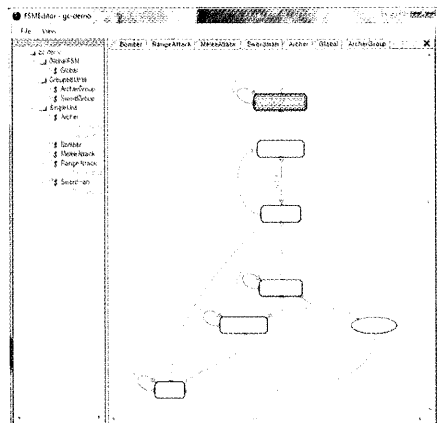


The module allows developers to easily define complex state machines that describe the agent's behavior with a certain degree of unpredictability as defined by the game designer. The hierarchical nature of the FSM module allows users to nest sub-FSM modules inside the main module. User-specified variables, such as attack systems, preconditions, and probabilities can be inherited or individually defined, giving developers even more flexibility while helping them maintain better control of the gameplay.

Both the behavior module and the FSM modules can act as stand-alone modules or can be used in conjunction with the xait-Engine.

### Intelligent Navigation

Enabling agents to move intelligently within a game world is a highly



complex task. Many times, movement is based on fixed navigation graphs defined manually, which can be time-consuming and error prone. xaitment offers two advanced modules to simplify the process.

The NavMesh Generator module uses a unique spatial subdivision technique for creating navigation meshes. Developers simply enter specifications about the environment and the agents into the generator, and navigation meshes are created automatically. This data is generated in a matter of seconds, enabling a game designer to easily make changes to the game map and to try many different possibilities to improve the gameplay. Once generated, the data will be interpreted by the second module, known as the Movement module, which enables agents to intelligently navigate the game world.

The Movement module supports different agent types and both dynamic and static obstacle avoidance on a per agent or agent type basis. Featuring numerous behaviors (e.g. move, seek, flee, etc.), the Movement module allows for custom behaviors to be added easily. Behaviors can also trigger other behaviors or be queued to execute in sequence (e.g. goto position A, goto position B, guard position C, hide and seek when enemy is near,

etc.), providing the flexibility needed to achieve realistic movement.

### The Future is Here

Game AI is a complicated process. If handled manually, it requires painstaking hand-coding that is often error prone. Today's tools offer greater relief to that manual process, but most provide little flexibility in terms of the solution itself.

xaitment has not only improved upon game AI with unique features guaranteed to heighten a game's immersive qualities, they have developed an intuitive, modular system that enables studios to easily integrate only the AI features they need, and none they don't. The modules are easier to integrate into existing pipelines and less difficult to customize. And each ships with a graphical user interface that eliminates coding and opens the door to designers who've historically had little to do with the AI process. Overall, the use of middleware solutions like xaitment's offers studios a less risky, more manageable, more flexible and far more cost-effective approach to game AI.

Holger Offermanns, Technical Director of Zone 2 Media, has experienced the benefits of xaitment's modular approach first-hand. "We did not have the resources to dedicate to creating AI from scratch and we didn't need, or have time to implement, an entire solution. xaitment gave us the option of quickly implementing sophisticated modules that met our exact AI goals."

The tools and features described above are only a subset of what xaitment offers, which is one of the reasons why they've experienced such tremendous growth in the last few years. Game developers throughout Europe have been quick to adopt their intelligent technology and their unique approach. And with the opening of a second office in San Francisco, CA, one of the hearts of the game development industry, xaitment stands poised for success in the US market as well.

[www.xaitment.de](http://www.xaitment.de)