PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO

Pedro Luchini de Moraes

Motion Synthesis for Non-Humanoid Virtual Characters

DISSERTAÇÃO DE MESTRADO

Dissertation presented to the Postgraduate Program in Informatics of the Departamento de Informática PUC–Rio as partial fulfillment of the requirements for the degree of Mestre de Informática

Advisor: Prof. Bruno Feijó

Rio de Janeiro
March 2010

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Pedro Luchini de Moraes

Pedro Luchini graduated in Computer Engineering from PUC-Rio in 2005. He has worked as a programmer in several small and large enterprises, including Eonsgames, Positivo Informática, and K2 Sistemas. As a result, he has a broad range of skills in many different software platforms and research fields, among them educational software, mobile game development, and geographic databases. Since 2008 he works at PUC-Rio's Computer Graphics research laboratory (Tecgraf), specializing in real-time 3D rendering and virtual reality applications. In his spare time, he is an amateur video game developer.

To my brother Francesco, who has always been my #1 fan.

Acknowledgments

Abstract

Luchini, Pedro; Feijó, Bruno. **Motion Synthesis for Non-Humanoid Virtual Characters**. Rio de Janeiro, 2010. 49p. MSc Dissertation — Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

We present a technique for automatically generating animations for virtual characters. The technique is inspired by several biological principles, especially evolution and natural selection. The virtual characters themselves are modeled as animal-like creatures, with a musculoskeletal system that is capable of moving their bodies through simple physics principles, such as forces and torques. Because our technique does not make any assumptions about the structure of the character, it is capable of generating animations for any kind of virtual creature.

Keywords

Artificial intelligence. Artificial life. Biologically-inspired computing. Procedural animation. Genetic algorithms. Physics simulation.

Resumo

Luchini, Pedro; Feijó, Bruno. **Síntese de Movimentos para Personagens Virtuais Não-Humanóides**. Rio de Janeiro, 2010. 49p. Dissertação de Mestrado — Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

Nosso trabalho apresenta uma técnica capaz de gerar animações para personagens virtuais. A inspiração desta técnica vem de vários princípios encontrados na biologia, em particular os conceitos de evolução e seleção natural. Os personagens virtuais, por sua vez, são modelados como criaturas semelhantes a animais, com um sistema locomotor capaz de movimentar seus corpos através de princípios simples da física, tais como forças e torques. Como nossa técnica não depende de nenhum pressuposto sobre a estrutura do personagem, é possível gerar animações para qualquer tipo de criatura virtual.

Palavras–chave

Inteligência artificial. Vida artificial. Computação inspirada na biologia. Animação procedimental. Algoritmos genéticos. Simulação física.

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Ce qui embellit le désert, dit le petit prince, c'est qu'il cache un puits quelque part...

Antoine de Saint Exupéry, *Le Petit Prince, Chapter XXIV.*