A Development Environment
for Designing Interactive Characters with Sensorimotor Models

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1 Introduction

Recent progress of interactive techniques brought intuitive and physical interaction with characters in entertainment field such as console games. Conventional motion generation method requires preparing an enormous number of motion patterns in order to implement various reactions of characters. Therefore, for an easy way of implementation of various reactions, virtual creatures with sensorimotor models will become useful. Virtual creatures [Mitake et al. 2007] are characters with sensorimotor models generate motion in physics simulation environment. It consists of 4 main components:

1. Articulated rigid body model which decides characteristics of dynamics.

2. Models of external sensors such as visual, tactile, auditory sensors.

3. AI scripts which decide behaviors from output of sensor models.

4. Motor controllers which generate motions to implement the behavior.

However, there are a lot of parameters such as spring-damper coefficients and range of visual field. It is difficult to predict the resulting motions from these parameters. Thus, we propose a novel development environment that can smoothly design characters with sensorimotor models.

2 Innovation

For creating a character with sensorimotor models, the proposed environment has two following features in addition to usual modeling and animation tools:

The first one is visualization of sensorimotor models and their parameters. For example, a visual sensory model has parameters of the visual field. These parameters represent three-dimensional space. Thus, simple adjustment based on numerical values is troublesome. By visualizing with 3D computer graphics, we propose an environment in which intuitive adjustment becomes possible.

The second is motion confirmation. When we adjust parameters, their changes are immediately applied to motion of character inside developing environment. This feature provides smooth confirmation of changing of character motions caused by parameter adjustment.

Simulators of physics and sensorimotor models are necessary to confirm the reactive motions of virtual creatures. Therefore, the
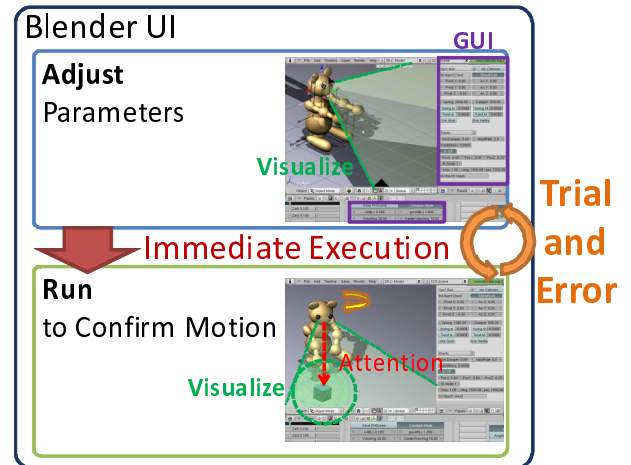

Figure 1: *system overview*

proposing environment provides integration between a character design system and simulators. In this research, we have built a development environment that can provide both character body shape design and parameter adjustment, based on Blender[Blender.org]'s combination of design environment and game engine. We integrated an in house physics simulator and sensorimotor models of virtual creatures into Blender. Accordingly, many users who get used with Blender can easily create virtual creatures.

3 Vision

Recently, in areas such as video game, augmented reality and 3D input devices are increasing rapidly[Aoki et al. 2009]. Hence, in applications using these devices, character needs a huge number of reactions. As the proposing environment supports designers to easily create and tuning characters, we expect that it will be utilized widely in the near future.

References

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