

Actor Technology Demo

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Printed in Canada.

Overview

This document describes the demonstration program (demo) *Actor* distributed with the MathEngine Toolkits and located in the demos folder of the MathEngine Toolkits distribution.

The Actor Technology Demo features Vivid Image's latest 3D game engine using MathEngine's Dynamics Toolkit and is therefore an ideal showcase to show the power of the MathEngine Toolkits.

The Dynamics Toolkit is an Alpha version and still being enhanced and optimized. The Actor 3D engine is also undergoing a lot of tweaking and optimization and new features such as dynamic shadows will be added soon.

This demo demonstrates the successful application of physics in a gaming environment. Manipulate complex physics objects that demonstrate natural behavior. There are some little surprises to discover too, just click away!

Hardware Requirements

Suggested minimum requirements to perform a thorough evaluation of the MathEngine technology are as follows:

- Windows 98/2000
- Pentium II 266+
- 256MB RAM (less RAM yields acceptable performance)
- 8 MB Video Card with D3D support

Tested with Matrox G200/G400, ATI Rage 128, Voodoo2 (8MB+, Windows 98 only), Voodoo3, NVidia GeForce and TNT/TNT2 based cards.

For best performance please make sure you've installed the latest drivers for your video card.

Vivid Image intends to provide support for more cards and release patches/updates to the demo. Please let them know (actor@vividimage.co.uk) if the demo does not work on your card.

The Environment

The Actor Demo takes place inside a room in an ancient oriental building. It seems to be used mainly as a boxroom as it is filled with numerous objects packed together in all four corners of the room. Apparently, the room may be used also as an activity room, as a pool table, as a basketball basket and a soccer goal have been putted away in that room with their respective balls along with the chairs and tables. There is even one running shoe lying on the floor.

Two different activities are available to you: playing with the sport toys lying around or unleashing your rage upon the objects the room contains by smashing them together or even bombing them.

The pool table is readily usable: just click on the light switch over the table, grab a billiard cue and start breaking the billiard balls' alignment as you would with a real pool table. To focus on a ball, just click on that ball until it becomes highlighted and moves the mouse slightly: the camera view will automatically center about that ball. Place your cue on the table and adjust its position until you feel the ball will be on its way to a corner, then hit it!

The basketball and soccer balls can be used intuitively: pick one up and throw it toward the goal or the basket on the wall. You may wish to use the running shoe to push the soccer ball around as well.

When you feel ready to unwind a bit more, pick up any object (i.e., a chair) in the room and slam it against anything else in the room to create the desired mayhem. If you feel a bit lazy, you may use a bomb instead as it will cut out the work for you. But first, you may want to create an interesting setting to destroy, by building up a scene.

A scene is the set of all the objects, positions and orientations in the room. Different scenes can be constructed by moving objects around in interesting configurations and saved for later use. For example, you could stack different objects together in an elaborate way (which can take a long time) just for the pleasure to see how it would fall apart if a bomb was placed beside it (a matter of seconds, at most). Saving a scene before destroying it would allow you to restore it easily before repeating the carnage using another method.

Toolkits Demonstrated: Dynamics and Collision

The ActorDemo may look like a run-of-the-mill FPS game, but it is actually an interactive test-bed that demonstrates the power of MathEngine's Dynamics and Collision Toolkits to simulate a wide range of behaviors in real time.

Dynamics Discussion

All the objects in the room obey the fundamental law of dynamics. Throw a ball and it will behave as any ball should: its trajectory will be determined by the impulse it received from the user, by the force of gravity pulling it down and by colliding with other objects and reacting accordingly.

Collision Discussion

Perhaps the most impressive aspect of this demo is how natural the interactions between the objects look. This effect is due to the MathEngine Collision Toolkit that detects collisions or contacts between distinct objects. The Collision engine keeps track of the position of each object in the room and test only pairs of objects that are likely to come into contact with one another, avoiding the computing cost of testing all pairs of objects at each time step. Each collision test is performed according to the nature of the pair of objects: each pair has a dedicated and specialized algorithm that test for contact.

To see the power of the Collision engine in action, take a ball and put it in a paper bin or put it below a chair. Notice that the ball doesn't intersect with the bin or the parts of the chair. Another example is to tangle the lamps together or with one of the building beams. The lamps can be easily untangled and no sticking effect takes place.

Controls

In the rest of this document, the symbol LMB and RMB stand for Left Mouse Button and Right Mouse Button respectively. A control between brackets (i.e., <LMB>) means that the control (key/mouse) must be activated continuously.

Mouse Controls

Mouse Control	Action and Description
<Roll Up>	Rotate Upward This action rotates the camera upward about a fixed point.
<Roll Down>	Rotate Downward This action rotates the camera downward about a fixed point.
<Roll Left>	Rotate Left This action rotates the camera to the left about a fixed point.
<Roll Right>	Rotate Right This action rotates the camera to the right about a fixed point.
<LMB> + Highlighted Object	Pick Up An Object To pick up an object, first place the mouse pointer over that object so that it becomes highlighted. Then press the Left Mouse Button. As long as the LMB is pressed the object will move along with the mouse pointer.
<Roll Up> + Picked Up Object	Move Object Farther This action moves a picked up object away from the camera along the view axis of the camera.
<Roll Down> + Picked Up Object	Move Object Closer This action moves a picked up object closer to the camera along the view axis of the camera.
<SHIFT> + <LMB>	Fly Forward This action moves the camera forward along the view axis of the camera.
<SHIFT> + <RMB>	Fly Backward This action moves the camera backward along the view axis of the camera.

Key Controls

Control Keys	Action and Description
F1	Interactive Help On/Off Toggle This key toggles an on-screen help menu. The help menu is superimposed over the current screen content and the game is not paused during its activation. Press F1 again to see the credit screen. To return to the game, press F1 again. Press SHIFT to make the Fly Mode menu appear.
Esc	Exit Demo This key exits the game. You'll be asked to confirm your choice before returning to Windows.
Enter	Reset Scene This key reset the scene to its initial state.
B	Throw a Bomb A bomb is thrown several feet in front of the camera. If the bomb is not yet lighted, the bomb must be first picked up to be ignited. There is a delay of three seconds between the ignition and the explosion.
G	Gravity On/Off toggle This key toggles the gravity between zero (no gravity, everything floats) and 9.8m/s² (earth's gravity).
Z	Undo Reset the scene to the state just before the latest action took place.
CTRL + Z	Quick Save Save the current scene configuration as is, under its initial name. No confirmation message will appear.
CTRL + S	Save Scene Save the current scene configuration. You'll be asked to choose a name for the scene file and to confirm your choice.
CTRL + L	Load Scene You are offered a list of saved scene files. Pick one and confirm your choice.
V	Disable Pointer Follow On/Off toggle By default, the viewer orientation follows the mouse pointer with a certain delay. To make the viewer orientation stands still, press V.

Control Keys	Action and Description
SHIFT	Center View Forces the screen to be centered about the mouse pointer.
<SHIFT>	Fly Mode Triggers the Fly Mode that lets the camera move freely in all directions inside the room.