PHYSICALLY-BASED SIMULATION OF SOFT BODIES IN INTERACTIVE SYSTEMS AND GAMES

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Project Introduction

- Interactive Game with Physically-based Interactive System
- Interactive System consists of Soft-Bodies & Rigid-Bodies
- Implementation of Forces applied on Soft-Bodies & Rigid-Bodies
Simulation Methods

• Verlet Integration [Advanced Character Physics T.J.]
• Rigid Body Simulation using Particles
• Collision Detection & Handling
• Soft-Body Simulation
MILESTONES – What we achieved

**Project Goals**

1. Set up Basic Scene
2. Rigid-Body Implementation
3. Collision Handling for Rigid-Body
   - OBB vs OBB (90%)
   - OBB vs Sphere
   - Sphere vs Sphere
4. Soft-Body Implementation
5. Soft-Body Collision Handling
6. Interactivity

**“Above and Beyond!”: Additional Goals**

1. Cloth Simulator
   - Tool with parameter settings
2. Dynamic Octree (90%)
3. Soft-Bodies of rigged and skinned meshes
Rigid Body

Sphere|Sphere

Sphere|OBB

OBB|OBB
Rigid Body

Sphere|Sphere  Sphere|OBB  OBB|OBB
Rigid Body

- Sphere|Sphere
- Sphere|OBB
- OBB|OBB ✓
Rigid Body

Sphere|Sphere

Sphere|OBB

OBB|OBB  ⚠️
Challenges – OBB|OBB Collision
Challenges - Octree
Challenges - Octree

- Octree for collision detection
Challenges - Octree

- Octree for collision detection
Rigid Body

Fixed Joint
Soft Body

Constraint solver using mesh
Soft Body

What we struggled with in the start
Cloth Simulation

Composition/Construction

Bend  Structural  Shear
Cloth Simulation

Only with shear and structural constraints
Cloth Simulation

Collisions
Cloth Simulation

Collisions
Cloth Simulation

The Struggle
Interactivity
Softbodies of skinned meshes
Softbodies of skinned meshes
The Return of the Meatballs
THANKS!