Project Number	TQP102
Project Title	Real time collision deformations
Project Description	Next-generation consoles give us new powerful CPU, GPU, and sufficient storage to solve many of the game problems in real-time. Among them is real-time collisions deformations and destructions. Compared to destruction, deformation is cheaper and can be done in real-time with current techniques, especially GPU based techniques. Brown Game Group presents a method for efficiently generating plausible dents and scratches due to collisions using bump maps instead of mesh deformation. When a collision occurs, they make multiple rendering passes to compute the bump map deformation on the GPU. Their method is limited by the dynamic range of the bump maps and will eventually saturate. Many articles on internet discuss about finite element method to solve this problem for simulation. The aim of this project is to create a frame work and algorithm that can apply deformation in real-time to collidable objects in games like cars, walls, rocks. The two approaches which are used to achieve this currently are finite element method, and procedural method. In finite element method, the mesh of the object is divided into elements and we use constrains to link elements together, then when collision happens we apply forces on elements which will change position and in turn affect the object's mesh. In procedural method, based on collision, we generate bump maps, or displacement maps and create deformation by applying these maps in vertex/pixel shaders.
Hardware/Software/ References	• http://graphics.cs.brown.edu/games/ • http://graphics.cs.yale.edu/julie/pubs/Fracture.pdf • http://www.geometry.caltech.edu/pubs/DDCB02.pdf • http://www.gamedev.net/community/forums/topic.asp?topic_

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