| Project Number | TQP103 |
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| Project Title | GPU based Physics |
| Project Description | The current trend is in using dedicated Physics card to solve physics in games and getting wonderful physics effects. However for next generation console like the PlayStation 3 and Xbox 360, there is no opportunity to plug in a custom hardware card but they have powerful CPUs and GPUs. We can use GPU to solve physics simulation especially for physics models that are tightly coupled with rendering like: litter and debris, smoke and fog, cloth and fluid, flocking and swarming enemies. A lot of effort is being put in this direction. Microsoft is planning to have physics API in DirectX SDK. Nvidia, ATI GPU support general calculation and have launched many R&D projects to investigate physics on GPU.<br><br>The aim of this project is to create a frame work for physics based simulation in games which can add realism to the game by using particle systems and rigid body instancing. The initial task of this project is to analyze current physics effects used in the current games like smoke, explosion, fire, water and then select candidate physics effects that can be incorporated in the GPU.<br><br>This is followed by building a framework that can run all the candidate physics effects in GPU to provide a fast physics simulation for these effects. The candidate effects can be:<br><br>• Litter and debris to add detail and realism<br><br>• Smoke & fog that reacts when you move through it<br><br>• Cloth and fluid that collide with objects and characters<br><br>• Massive amounts of rubble from collapsing buildings<br><br>• Flocking and swarming enemies<br><br>• Brittle fracture |

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| | - Advanced fluids: smoothed particle hydrodynamics.<br><br>- Advanced particle rendering: volumetric shadowing. |
| Hardware/Software/<br><br>References | - http://downloads.guru3d.com/download.php?det=1417<br><br>- http://www.theinquirer.net/default.aspx?article=32558<br><br>- http://www.gamespot.com/news/6136639.html<br><br>- http://download.nvidia.com/developer/presentations/2006/gdc/2006-GDC-NVIDIA-Havok_FX.pdf<br><br>- Microsoft Visual Studio 2005 C/C++ environment<br><br>- XLEngine |