

RIPS 2006 / Pixar Project Proposal:
Simulation of Many Colliding Deformable Solids for
“Set Dressing” and Arrangement

Project Mentors

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Problem Statement

Last year the Pixar RIPS team investigated the use of simple deformable body dynamics for simulating collections of soft objects, "the whirled peas project". That project made use of a shape-matching approach [1] for efficient deformable object simulation, and investigated different techniques for collision detection and resolution. Please see <http://www.ipam.ucla.edu/programs/rips2005/RIPS2005PixarProjectStatement.pdf> for more background information on last year's project.

Pixar has been continuing to investigate techniques of this sort for a number of applications. An application of particular interest involves the "set dressing" of collections of either soft or near rigid objects. Consider the construction of a CG tossed salad - even if no dynamics is required in the shot, the modeling and arrangement of the components is a tedious, time consuming effort.

We would like the Pixar RIPS team to continue along the lines of last year's project extending the technique to be applicable to objects with more complicated shapes and draping behaviors. The application of the technology to both quasi static (set dressing) and weakly ballistic (highly damped) dynamics are both quite interesting. In the dynamic case the introduction of a static friction parameterization is particularly important to control the effects of "creep".

Participants will investigate different approaches to this problem by developing code in C++ and leveraging an existing physics-based simulation library (called "PhysBAM").

References

- [1] Mathias Müller, Bruno Heidelberger, Matthias Teschner, and Markus Gross. *Meshless deformations based on shape matching*. ACM SIGGRAPH Symposium on Computer Animation, 2005.