

**Project Preliminary Proposal**

The term project will be to add some interesting new behavior to an existing dynamic simulation, or even to write one from scratch. The suggested starting point can be classroom demonstrations such as the balloon or the brick wall, but other code can be used. Examples of new behavior include having the balloon pop, flutter around after being punctured, having the balls punch holes in paper, etc.

The projects will be carried out by teams of about four students. Students should form provisional teams and submit a proposal as a team, following the guidelines below. For this first proposal teams do not need to be finalized and students are free to be listed on more than one project proposal. Team membership will be finalized about a week after the project proposal is due.

Each proposal should have the following information:

- Project Name
- Team Members
- Description of Behavior (see below)
- Physical Model (see below)
- Graphical Model and Features (see below)

*Behavior*— Indicate the starting point for your project (balloon, links, boxes, or other) and then describe the added behavior. The behavior must be interesting and depend upon variable physical constants (such as gravity or friction) and interactive state such ball position or balloon location.

This should be the most completely worked out part of the preliminary proposal.

Example: Add seams between tiles on ball platforms. When balls roll over seams they will bounce off and possibly damage the seams. Seam height can be adjusted, when very high the tiles will appear more like pigeonholes. If a ball hits slowly it will scuff (discolor) the seam, if it hits faster it will dent it.

*Physics*— Indicate ideas on how the behavior will be modeled. A detailed description is not needed for this preliminary proposal, but please put in some ideas. Include both ideas for physics and the physical state (the quantities that need to be stored to describe the system, such as position and velocity). The graded proposal will include suggestions.

Example: The amount of damage to a seam will be based on the change in kinetic energy of the ball.

Model each seam as having three faces, most are planar. Balls can strike a face or the edge between two faces. A ball strike of sufficient speed will shift the position of the struck seam. Details to be worked out. Physical state includes seam width, height, and strike points.

*Graphics*— Indicate how the behavior will be graphically modeled. Include ideas for any graphical state needed. As with physics, it is not necessary that this be worked out in detail.

Example: Seams will appear gray. When struck the seams will have either a spherical indentation or a circular mark. If struck hard enough the seam will bend and sparks will fly from the contact point.