Assignment 2: Animation, and Automating Animation

This is the first of two assignments that deal with the basics of animation and deformation, and then the scripting of animation so that it can be automated (and replicated procedurally). You'll be experimenting with creating a simulation of one bubble growing and rising (as if in a column of boiling water). Once you can hand-craft the animation through interaction with Maya (this assignment) you will explore in the next assignment how it is implemented through the scripting editor, and use that as a guide to write a Python script that can be replicated many times over to create the illusion of boiling water.

Readings: Autodesk Maya help sections on Animation. Either download the entire documentation or go online: http://help.autodesk.com/view/MAYAUL/2015/ENU/?guid=GUID-1290AC1A-7844-4249-B56D-2E7BA449A0CD Also, (re)read the Palamar text chapters 1 and 2 (as necessary), then chapters 5 and 6 for animation and deformers. There are many additional resources that you are encouraged to find, just by searching for whatever noun phrase, or verb phrase succinctly summarizes where you might be stuck (e.g., 'keyframing oscillation Maya', or 'animating blend shapes Maya'). The intervening chapters are very useful, but more concerned with surface modeling than you might need for this assignment. For now, concentrate on animation and rendering movies.

Deadline: One submission for this project, due EOD **Monday, 1/26** (Note that EOD = 11:59 PM of the given date). We will debrief in Tuesday's class (1/27).

Punctuality: ≥50% deducted if late (without prior arrangement and/or credible excuse).

The Maya-based modeling you've been doing up to now should have been familiarizing yourself with the Maya interface, and to an increasing degree, with the internal representation of the models. Now we begin scripting in Python using the Maya interpreter (rather than composing scenes interactively through the UI). You will probably still want to prototype and experiment interactively, then compose scripts that create the same results.

The project is to create (then render as a movie) an animation of the bubbles of water vapor that form when water is boiling, such as on a stove. Imagine a transparent vessel filled with clear water, with heat applied at the bottom, and as it comes to a boil, tiny bubbles form at the bottom (at first) then rise and expand until they pop at the top surface of the water. This example has plenty of room for creating increasingly sophisticated, and realistic, depictions of this process. It was chosen as it has many challenges for this class: key frame animation, modeling of deformable object, animation involving scaling and deformation along a path with acceleration, generation of new objects dynamically, and the controlled use of randomness under parametric control. Since it is open-ended, manage your time and learning process and frustration level.

Here is some reference videos of actual bubbles for you to examine.
http://www.shutterstock.com/video/clip-2926270-stock-footage-pan-up-and-down-of-water-boiling.html
https://www.youtube.com/watch?v=4tyr7ilmx-E
https://www.youtube.com/watch?v=3VCzXw8mooA

And some of many digital animations (from the simple to way-beyond-the-scope-of-this-course!)
https://www.youtube.com/watch?v=WRr-GVMUS0g
https://www.youtube.com/watch?v=ebHsiEBTd8E
https://www.youtube.com/watch?v=lCczn5qIhlU
http://area.autodesk.com/blogs/duncan/boiling_water (with download of .ma!)
https://www.youtube.com/watch?v=QycNxEL7gxQ

1. Start with a very simple model of a single bubble that can grow and take a journey upward. Note that you can approximate the bubble as a simple sphere (scaled to be flattened somewhat), and animate it as it begins at the bottom surface as a tiny bubble, then grows, then detaches at some point and rises, accelerates as it grows, and finally reaches the top. Create a key framed animation in Maya, seeing if you can make that work so that it is visually satisfactory. Create a simple movie of this scene. Save the scene as bubble_v1.ma, and the rendered movie as bubble_v1.mov (or some other movie encoding such as .mp4). Note that you can create simple oscillations (such as rotations) by keyframing, as the molecules vibrated in last year's assignment 2, as distributed. Note that this movie is to be created 'by hand', i.e. adding keyframes, and keying specific attributes with the intent of making a reasonable approximation of a single bubble as it forms, grows, and rises.
2. Study deformers as a way to distort and vary the shape of the bubble. Lattice deformers and blend shapes are both applicable to this problem. Experiment with them in a new scene bubble_v2.ma, and render a movie as bubble_v2.mov. Again, this is just one bubble animated, but hopefully looking a bit more realistic because the bubble itself will change shape as it rises. Note that your bubble project's scene folder should have two scenes, bubble_v1.ma and bubble_v2.ma by now.
3. Zip up the project, leaving just a few (10 or so) of the early autosaves of your two scenes, plus the scenes. The autosaves are to record early attempts to come up to speed on the project, but will not be judged critically :).
4. Render and zip up the movies. Depending on length and size, you may need to provide a link to them if they do not fit as simple compressed attachments.
5. Finally, include a PDF file giving a commentary that reflects on your experience. In the next assignment you will extend these ideas, creating a boiling water animation purely by program control. Note that only a few students really said much anything of consequence in the commentary. Please give me feedback about your experiences with the assignment by this means.