Winter 2020: CSI4130
Assignment 1

Due: Friday, January 31st, 2020, 11:00pm in Virtual Campus
University of Ottawa - Université d'Ottawa

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1 Animation with Scenegraph [10 in total]

In this assignment, you will build a jumping jack toy and implement an interactive animation based on a scenegraph in `Three.js`. Your animation will have to follow a very similar approach to the Solar animation lab. For the purpose of this assignment, you are asked to use basic geometric shapes directly available in `Three.js` such as boxes, cylinders and spheres.

This is an individual assignment. You are not allowed to use any other library except `Three.js` and `dat.gui.js`.

1.1 Toy Character [4]

Build a simple stick figure resembling a jumping jack toy. Your stick figure must be build as a scenegraph in `Three.js` with at least 17 separare primitives, i.e., cylinders, spheres or ellipses. An example of a jumping jack toy is shown in Figure 1. The minimum primitives are feet, lower legs, upper legs, torso, left and right arms, hands, neck, head, nose, two buttons on torso, string and marble. Your program must show the jumping jack figure in the inactive pose at start-up. The root node of your figure has to be the torso. The jumping jack in the picture looks 2D but your character is to be a 3D character. Provide controls with corresponding sliders in dat.gui to control the head by the user. The head has to be able to move right/left and forward/backward. Place the stick figure in the middle of the window.

1.2 Camera Control [3]

Use dat.gui sliders for two angles to control the pose of the camera and for the position in 3D where the camera is directed to (the *at* position). The angles must be rotating the camera in a sphere aroud the *at* point. Select the radius of the sphere large enough such that it is outside your scene. In other words, your perspective camera will always need to look at the *at* point and your rotational controls will need to move your camera on a sphere around the *at* point. In order to make the control more intuitive, use dat.gui to turn on the display of a small sphere shown at the *at* point.

1.3 Animation [3]

Use a similar strategy than in the Solar example to make the legs and arms of the jumping jack toy move as the string with its marble is moved up and down. (Hint: A sine or cosine function may be helpful). Use dat.gui to give the user the option to switch the animation on and off.

1.4 Bonus: Duplicating [2]

Give the user an option to place additional jumping jacks into the scene giving control over the position to the user. For this question, you don't have to use hardware supported instancing (this will be covered in the webGL labs later) but only use the scenegraph features to render multiple copies. This is a bonus question and hence marks will be given only for successful (i.e., convincing) attempts.

2 Submission

Your assignment submission must consist of your Javascript and html file. As you are working with the current version of `Three.js` and `dat.gui.js`, you will not submit these.

Filename
jumpingjack.js
jumpingjack.html

You must submit the files listed above and no library files via Virtual Campus.

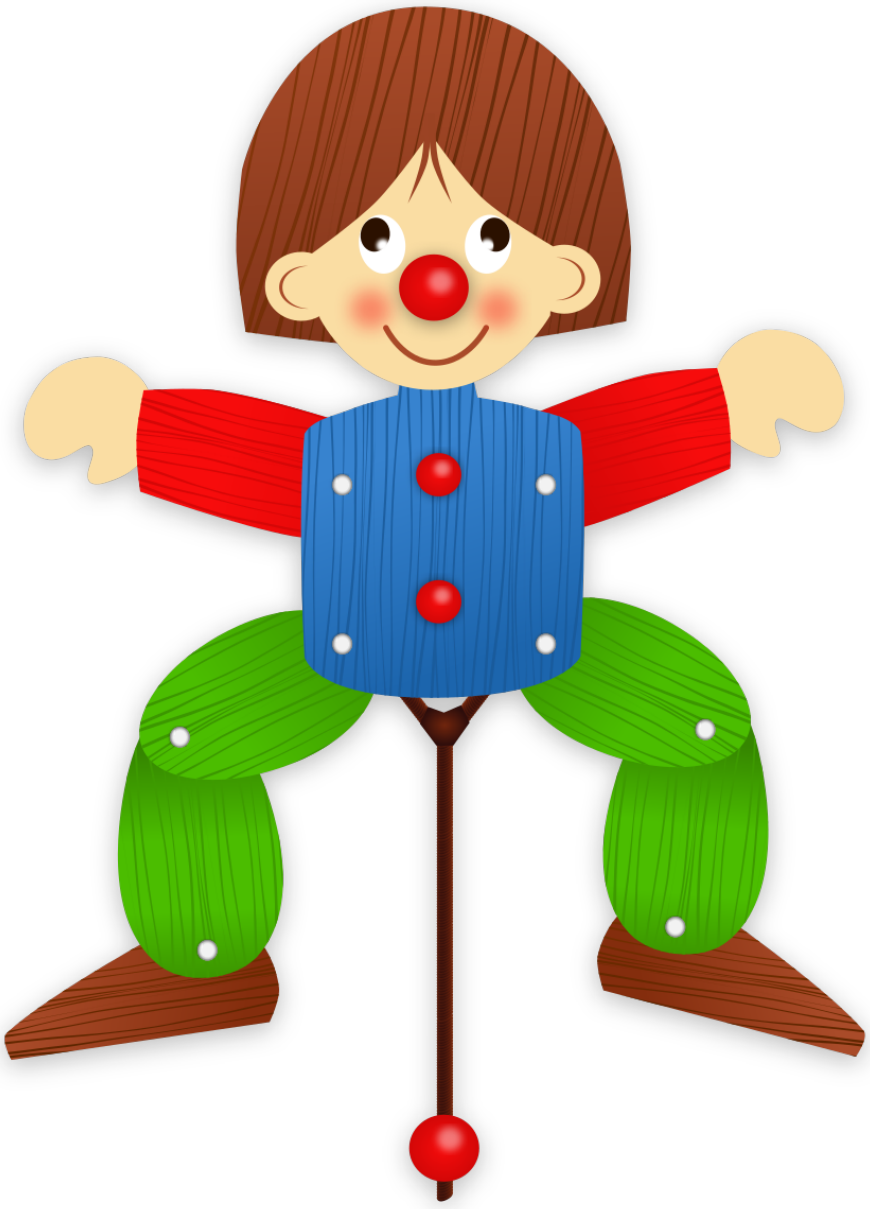

Figure 1: Example of a Jumping Jack Toy. Image source: Wikimedia Commons (Public domain)