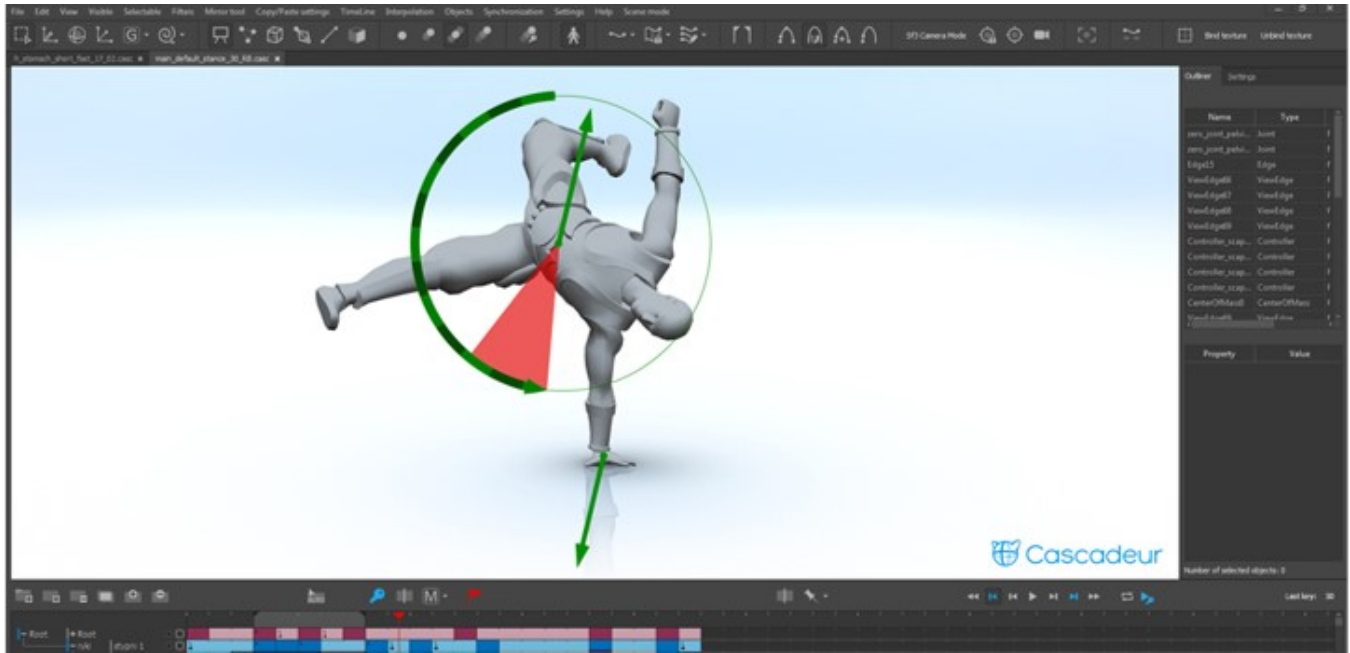# Physics-Based Character Animation With Cascadeur

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ABSTRACT

In this workshop we will create a realistic acrobatic 3D fighting animation using the animation software Cascadeur. We will learn the key features of physics-based character animation and will immediately apply the learned knowledge by creating an action sequence. Cascadeur is a new toolset that enables animators to create physical correct character animations for video games and movies - without the use of motion capture.

CCS CONCEPTS

• **Computing methodologies → Animation**; **Physical simulation**.

KEYWORDS

3d animation, physics-based animation, animation tools

1 INTRODUCTION

We will start with basic stuff and we will gradually move on to more complex and interesting parts of the software.

First we will explore the structure of Cascadeur, its features and tool-set. We'll learn how to manipulate the camera, move and rotate objects, use lock mode. Then we will cover changing the number of frames, work with outliner and property editor, see how selection groups are used and created.
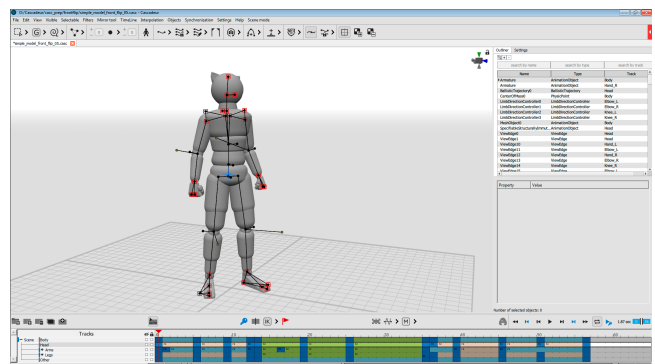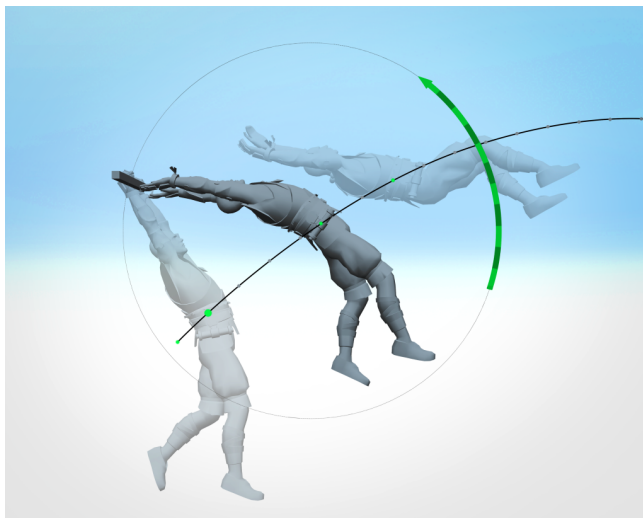

Figure 1: Program interface

Figure 3: Angular momentum visualization

Figure 2: Center of mass

2 TIMELINE

Then we'll move on to the timeline: creating, moving copying and deleting keys. We'll see what are the main functions of the timeline and in what aspects it differs from other animation software. We'll see how to work with interpolation, what interpolation types are present in the software and how to use them. We'll talk a bit about animation tracks and their usage.

3 CENTER OF MASS

Next we'll move on to work with the center of mass. After a small theory overview, where we'll find out:

- What is the center of mass.
- It's main characteristics.
- It's usual behavior and why it is important for the animator.

Then we'll move on to pose editing and see how the center of mass helps us there on practice. Then we'll create several centers of mass for different body parts.
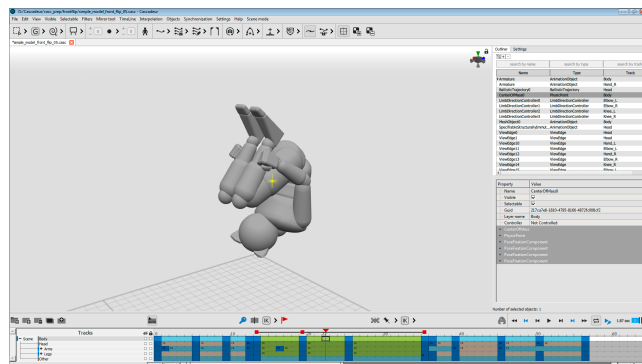
4 BALLISTIC CURVE

To move the center of mass correctly during the flight there is a special tool in Cascadeur - the ballistic curve. After an overview about its characteristics and what it corresponds with in real life, we'll try out this tool on practice. See how we can create it, how to change and manipulate its characteristics and how to use it to change the character animation. We will do this on a scene, where everything is already prepared beforehand, so it will be easier to understand how this tool is used in practice and what purpose it serves.

5 DEALING WITH ROTATION

After dealing with ballistics we'll move on to rotation. From the jump we just created and edited, we'll make a somersault. First we'll again dive into some theory about the angular momentum, look at it's visualizer and then move on to the special tool we have for jumps - the ballistic ghost. We'll cover its main principles, characteristics and see what can be achieved with it and understand its limitations.

6 FULCRUM POINTS

The previously used tools are not applicable if our character has any fulcrum point. To achieve a physically correct final result we will use a special tool - the Fulcrum Ghosts.