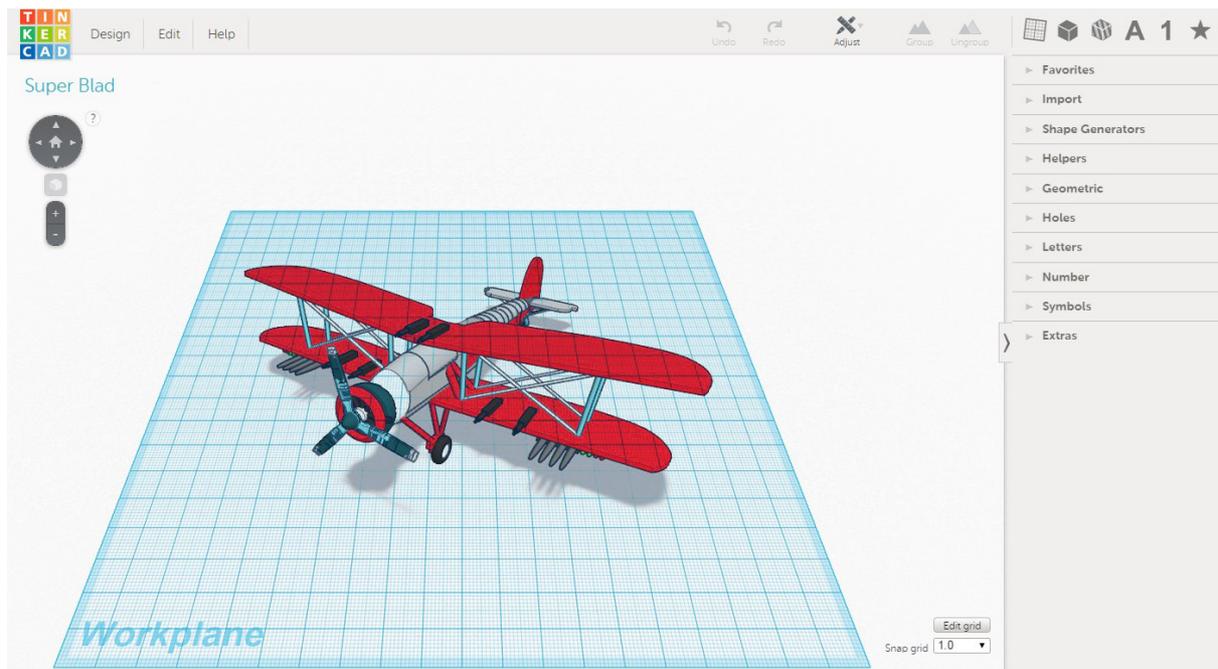


HCI: real-time simulation of forces

Background

What's the shape of a raindrop? Well, drop-shaped. What's the size of a raindrop? A few millimeters. What is the force that a raindrop experiences while falling? More like 100nN or more like 100mN? Six orders of magnitude difference, still I am pretty sure you just drew a blank. We are all good at estimating the size & shape of things, because that is part of our daily experience. Yet we fail at estimating forces, as these are invisible so we never got to build up any intuition about them.

When 3D editing computer graphics models this is not a problem, pixels are not subject to forces. For today, people edit for 3D printers, laser cutters, etc., i.e., for the physical world and there things break, sink, crash, and burn. We argue users should know this before it happens—ideally, **while** they are designing their model. Ideally, in real-time so they can try things out until they have a design that actually works.



Objective: figure out what will break, what will fly, and what will float while the user is editing the geometry

Software you will write & required skills

Write a physical simulation system that runs in a web-based 3D editor.

1. Write a system that simulates forces, e.g., building on **finite elements** or create your own **machine learning** approach. Store in a small repository.
2. Write everything else in **Coffeescript (~Javascript)**, so your code runs in the browser and can talk to the editor in real-time.

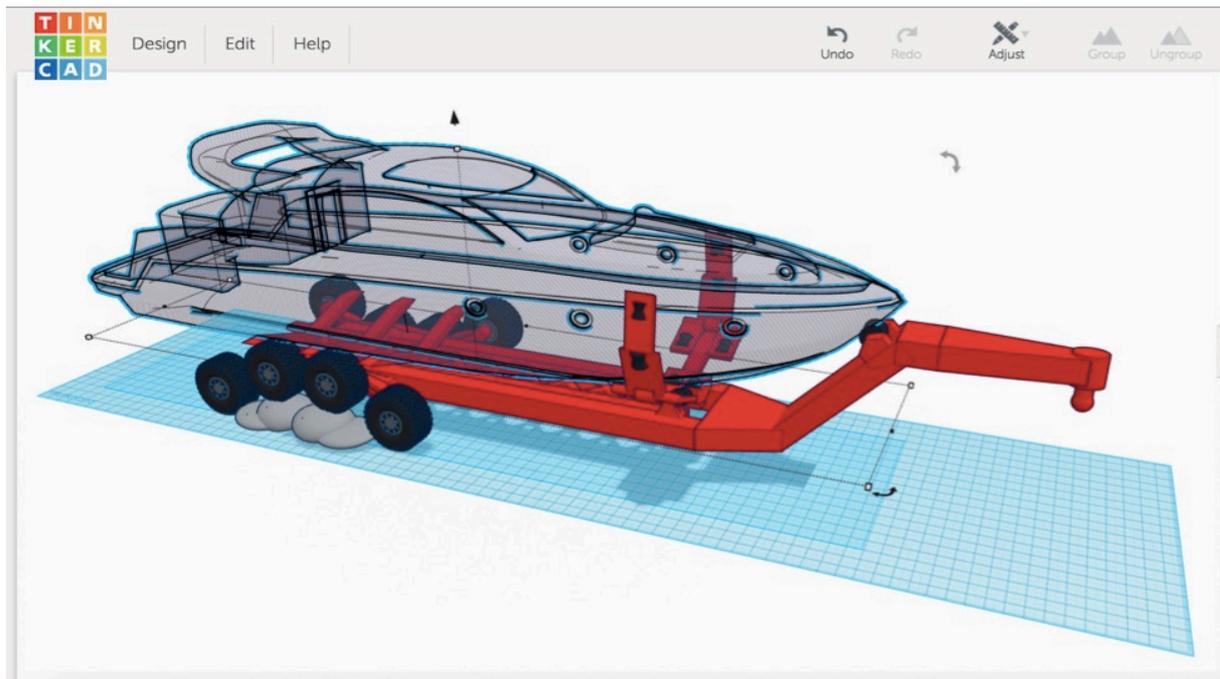
Ideally, you have **experience in 3D modeling and computer graphics, web development**. If you had **taken HCI2** and enjoyed it, that would be nice, but is not mission critical.

References to get you started

- Read “Pteromys: Interactive Design and Optimization of Free-formed Free-flight Model”
- Come talk to us

Contact

Human Computer Interaction Lab
Prof. Dr. Patrick Baudisch



Will it float or capsize?