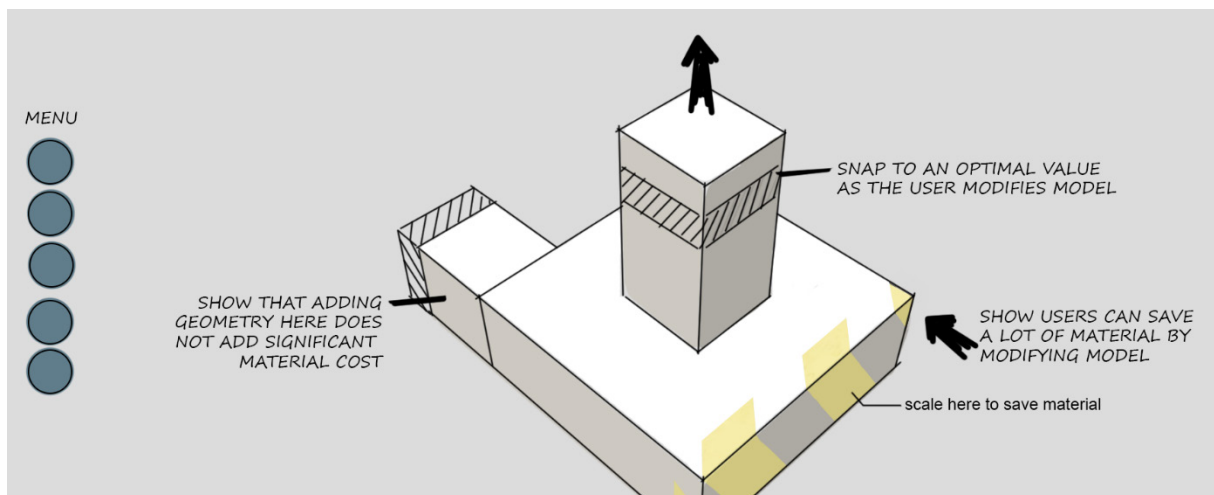


## In collaboration with MIT: Interactive 3D visualization for sustainable material optimization

Novel digital manufacturing processes, like laser cutting, allow each customer to personalize a product by adjusting its shape, function, and materials.

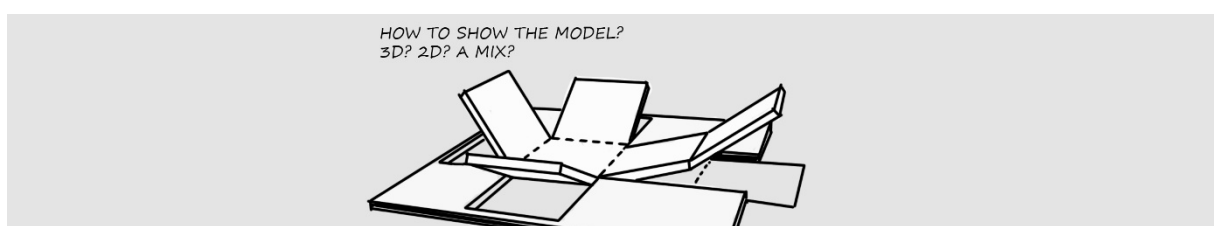
This new way of designing, however, poses new challenges for efficient material use and production time and in turn has a large impact on how sustainable these new manufacturing processes are.



In traditional manufacturing a product is optimized through an expensive “design for manufacturing and assembly” process to minimize production waste, optimize costs and production time. However, this process is beyond the reach of individuals aiming to create a one-off product or a small series.

In this project we aim to partially automate this design and optimization process, eliminating the cost, and thus bring it to the individual end users.

**Your objective:** Implement a system that allows users to interact with and explore the design space of acceptable modifications to their 3D model while creating a visualization that shows tradeoffs with manufacturing costs such as 2D material sheets and production time.



**Action items:** Write an algorithm that optimizes for different metrics generating multiple solutions. Decide which of the pareto optimal solutions to pick and present as suggestions to the user. Visualize these suggestions and allow the user to directly manipulate the results.

### **Technologies involved in this project**

1. Write in JavaScript/Typescript
2. Implement a parametric modelling interface
3. Write 3D Interactive tools to render and edit 2D plates in a 3D web-based environment
4. Write an algorithm that deals with an NP-hard problem
5. Integrate into a medium-size software system (Kyub, 240.000 lines of code, kyub.com)

**Your project:** Develop and test the new system using **real-world** application scenarios.

**And then deploy.** Help thousands of users worldwide save time and resources—and thereby extend the scope of personal fabrication to a non-technical audience.

### **Contact**

Email us at [muhammad.abdullah@hpi.de](mailto:muhammad.abdullah@hpi.de), [martin.taraz@hpi.de](mailto:martin.taraz@hpi.de), and [baudisch@hpi.de](mailto:baudisch@hpi.de) or come talk in person on the 2<sup>nd</sup> floor of the main building (H-2.33).