

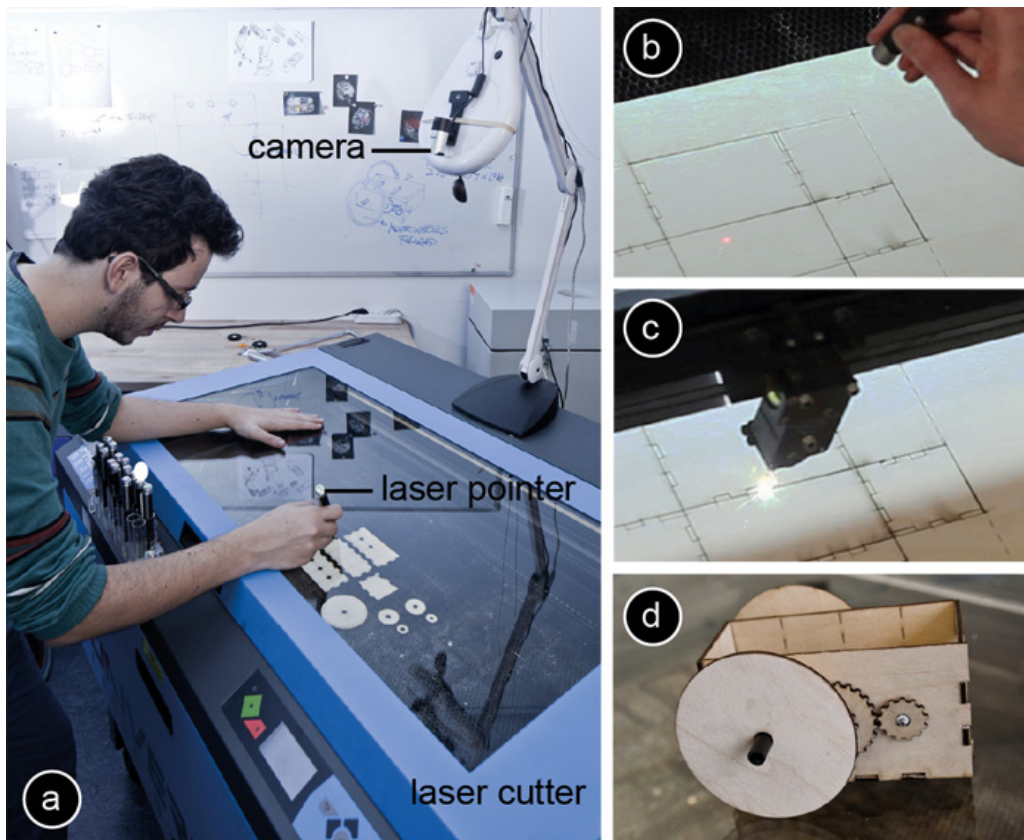
HCI Project: Interactive Lasercutting

Abstract: your goal

The goal of this project is to create a fast and reliable interactive fabrication system that allows for walk-up use by inexperienced users and to make it available to hundreds of *Fabrication Labs* worldwide. As a basis, we will provide you with *constructable* [youtube.com/watch?v=8g3LaF9oVFY](https://www.youtube.com/watch?v=8g3LaF9oVFY) a research prototype that allows users to create physical objects by directly interacting with a laser cutter.

Your task will be to (1) add functionality to the system so as to allow it to be used by users without fabrication experience and (2) to re-architect the system to make it robust enough to allow for world-wide distribution.

You will be working closely together with *Fabrication Labs* in Potsdam, Berlin, and Barcelona to test deploy the code base. You will also conduct user testing to help determine the best interaction model to implement.



You will design and build based on *constructable*, a research prototype that allows users to create physical objects by drawing directly on the workpiece using a handheld laser pointer.

Background

Within the last years, the costs for personal fabrication tools, such as 3D printers and laser cutters, dropped dramatically making the technology increasingly mainstream. Using online services, such as Shapeways, everybody can now fabricate physical objects of their choice for a few dollars.

Recently the US copy shop Staples announced that they will set-up 3D printers in their stores worldwide, allowing everybody to just walk in and fabricate a design

<http://www.wired.com/design/2012/11/staples-goes-3-d>.

We like the general vision of helping consumers actively make their own physical objects and we want to drive it forward. In particular, (1) we want users to not only print objects, but to design them as well and (2) we want users to get results on the spot. While 3D printers take hours, a laser cutter-based system can deliver in seconds.



Constructable demo in Barcelona. This prototype required us to guide users through the process and to explain what to do. Your goal is to eliminate the need for training, allowing for walk-up use.

This project is for C++ programmers who like to work with an existing (well-structured) code base. You will learn how to control a laser cutter using code, how to do camera tracking, image extraction using computer vision, and sketch recognition. Upon completion, you will share your code online and deploy it in several *Fab Labs*.

References to get you started

- Watch “constructable: interactive laser-cutting” on Youtube and read the paper
- Check out the C++ code base with OpenCV, QT, Boost, Protobuf, Canon SDK (ask Stefanie for access)
- Read Master Thesis “Cut by Cut” by Konstantin Kaefer (ask Stefanie)
- Read “Interactive Fabrication” by Karl Willis

Contact

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