

# FabLab — Fabrication Laboratory

Ursprung, Gegenwart und Visionen

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DIY Vorlesung – 26. April 2019



# Überblick

Vergangenheit und Zukunft

- Was sind FabLabs?
- Wie kam es dazu?
- Das FAU FabLab
- Mithelfen?

# Was sind FabLabs? Wie kam es dazu?





- **Idee von Prof. Gershenfeld (MIT)**

- **Center for Bits and Atoms (CBA)**

- Fertigung von  $10^{-9}\text{m}$  bis  $10^1\text{m}$
- „Das 10 Millionen Dollar FabLab“

- **Vorlesung „How to Make (Almost) Anything“**



# „How to Make (Almost) Anything“

## RGB LED POI

- An illuminated orb for spinning about and looking real neat.
- Powered by AtTiny 45
- 12 high power LEDs
- Millions of Color Combinations
- Short lasting battery life
- Minutes of fun!



**FAB LAB** Steven Fett  
Fab Academy 2016

## Stand Up For a Better Future

By Kadin Feldis

A standup Desk that will change the way we think about working and provide a stable platform for working and making.




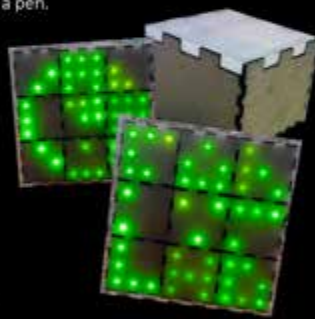
CITC FAB LAB

Inspired by Wendy's 2013 final project for a standup desk. This desk will build upon that idea by adding linear actuators so the desk surface can move from a sitting to a standing position with the click of a button.



## LASER NODES

LaserNodes is an Open Source electronic project. It is conceived as an electronic arts product that will allow the user to create a custom LED screen which you can write or draw just using a laser pointer as a pen.

**Main Features:**

- Case Box with parametric design source files and press fit construction
- 9 LEDs per node (3 x3).
- It uses the LEDs as light sensor.
- Uses Attiny84 microcontroller.
- User Interface using processing.org, that allow the user send images from computer through serial communication.
- Fully developed in free softwares.
- Scalable up to 127 nodes.

by Siron Pereira - sironcesar@gmail.com  
AS220 Labs / FabLab Facens

## Fab Kerbal

A display console designed for use with Kerbal Space Program

- Displays Essential Flight Data
- Provides basic control of ship functions
- Prevents rapid unplanned disassembly



By Ki Fredeen  
Fab Lab Alaska

## Sam's Sweet Smoker

By: Sam Guzauskas




Three S is a fabbed, wood designed, fish smoker. The wood paneling is fitted around a 2"x4" frame to maintain the structure and the design can be easily altered to meet specific sizing. A dual, electric hot plate will be used with one side to smoke the smoker chips and the other side acting as a heating element. An embedded circuit board, based on the BARDUINO design, built here in the CITC Fab Lab controls an LCD and temperature sensor to monitor the temperature inside of the smoker.

**FAB LAB**

## Echolocation Goggles

Ian Brauner




**FAB LAB**  
Charlotte Latin School

# „Personal Fabrication“ (vs. „Personal Computing“)

- Befähigung von Einzelpersonen
  - Kompakt, einfach, nützlich und bezahlbar
- Personalisierte und maßgeschneidert
  - Aber kein Ersatz für Massenware
- Vorort und on-demand
- **Vision:**
  - Globale Ideen und lokaler Produktion (FabCity)
  - Digitale Fertigung



# „3rd Digital Revolution“



<https://www.youtube.com/watch?v=L0RDrSKenGo>

# „3rd Digital Revolution“

**Digitale Fertigung  
(z.B. Kind mit Lego)**

**≠**

**Digitaler Fertigungsprozess  
(z.B. 3D-Drucker)**





## The Fab Charter

### ***What is a fab lab?***

Fab labs are a global network of local labs, enabling invention by providing access to tools for digital fabrication

### ***What's in a fab lab?***

Fab labs share an evolving inventory of core capabilities to make (almost) anything, allowing people and projects to be shared

### ***What does the fab lab network provide?***

Operational, educational, technical, financial, and logistical assistance beyond what's available within one lab

### ***Who can use a fab lab?***

Fab labs are available as a community resource, offering open access for individuals as well as scheduled access for programs

### ***What are your responsibilities?***

*safety:* not hurting people or machines  
*operations:* assisting with cleaning, maintaining, and improving the lab  
*knowledge:* contributing to documentation and instruction

### ***Who owns fab lab inventions?***

Designs and processes developed in fab labs can be protected and sold however an inventor chooses, but should remain available for individuals to use and learn from

### ***How can businesses use a fab lab?***

Commercial activities can be prototyped and incubated in a fab lab, but they must not conflict with other uses, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success

- **Vorgaben für Fertigungsverfahren**

- Empfehlungen für Ausstattung
- getestete Maschinen

- **FabFoundation**

- Stiftung
- Lobbyarbeit in den USA
- Globale Koordination

- **FabAcademy**

- Globale Vorlesung in 57 FabLabs



The map displays the global distribution of sampling locations. The legend indicates that the locations are categorized by color: red (n=1), yellow (n=2), green (n=3), blue (n=4), and orange (n=5). The map shows a high density of sampling locations in North America, Europe, and Asia, with a more sparse distribution in Africa, South America, and Australia. The map also includes labels for major oceans (North Atlantic, South Atlantic, Indian, Pacific) and seas (Beaufort, Norwegian, Coral, Tasman).



# Einordnung

- Hackerspaces & Makerspaces (seit den 80ern)
  - Grassroot Bewegung
  - Sozialer Treffpunkt
  - nicht immer offen für die Allgemeinheit
  
- FabLabs (seit 2005)
  - ...
  
- TechShops
  - Kommerziell, nur für Mitglieder

# Wie entstand das FAU FabLab?

In Holland.



2009

2010



...

in Holland



Anfang  
2011

25. Juli  
2011



**ICH KANN!**

Das temporäre Museum der Kreativität



in Erlangen

# Das FAU FabLab



# Ein FabLab an der FAU?



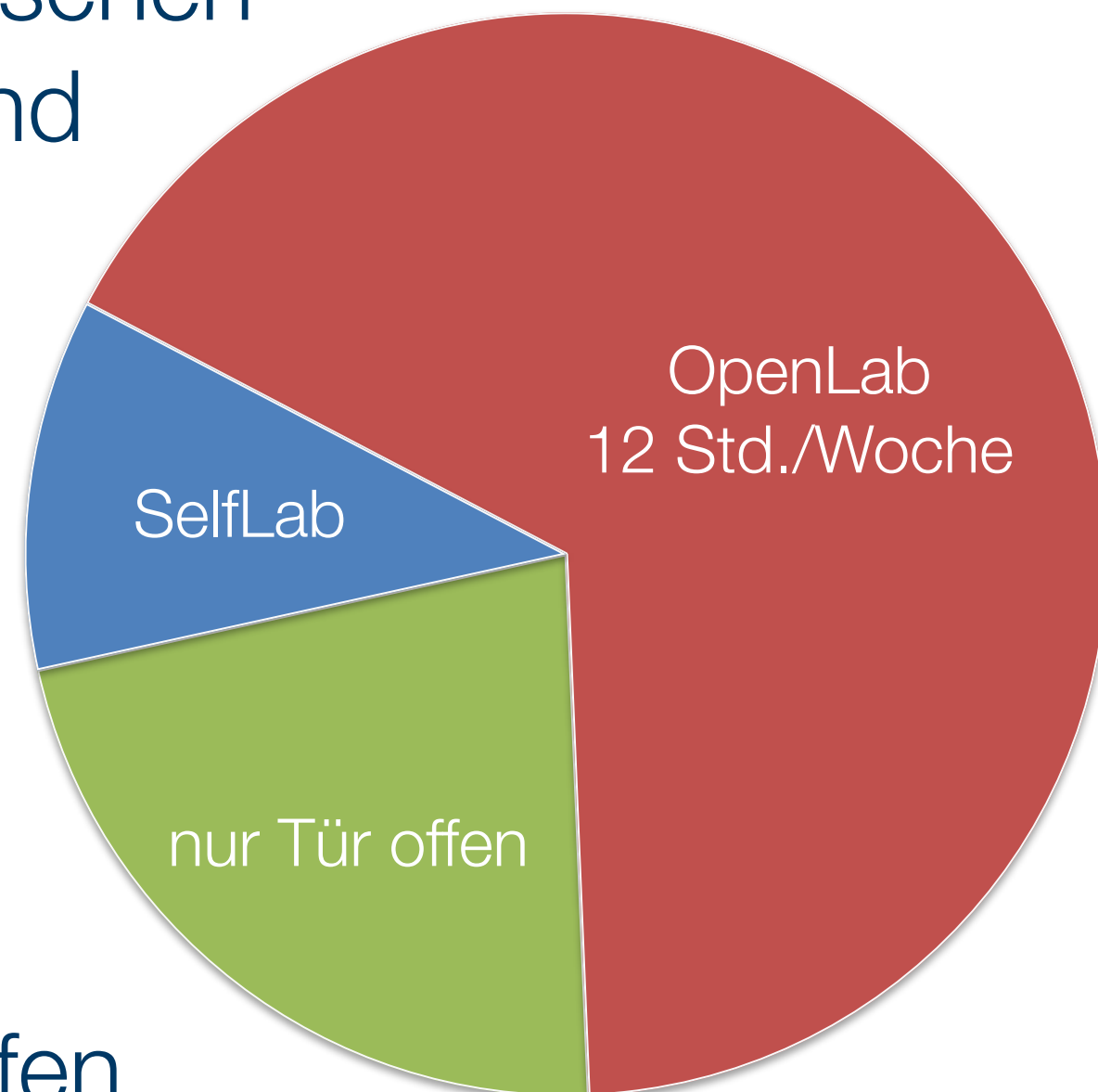


# Organisation

- Alles ehrenamtliche Arbeit
  - Organisationskern: ~5 Personen
  - „Aktive“: ~40 Personen
    - 30 Studierende
    - 6 Doktoranden
    - 4 Externe
  
- Sehr viel Bürokratie durch täglichen Betrieb
  - 3.600 Emails pro Jahr
  - 1479 Produkte zum Verkauf

## Nutzung (WS 2018/19)

- Keine Unterscheidung zwischen Studenten, Mitarbeitern und Externen
- 1296 Besuche gezählt
- 18 Stunden pro Woche offen



# Ausstattung



Lasercutter



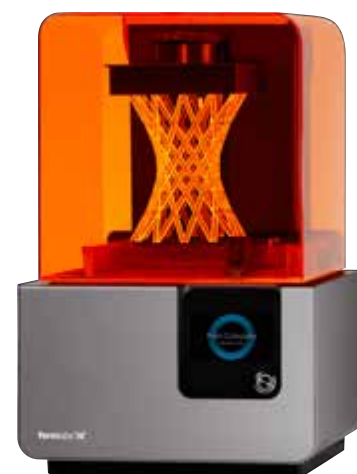
CNC-Drehbank



CNC-Fräse



3D-Drucker



Schneideplotter

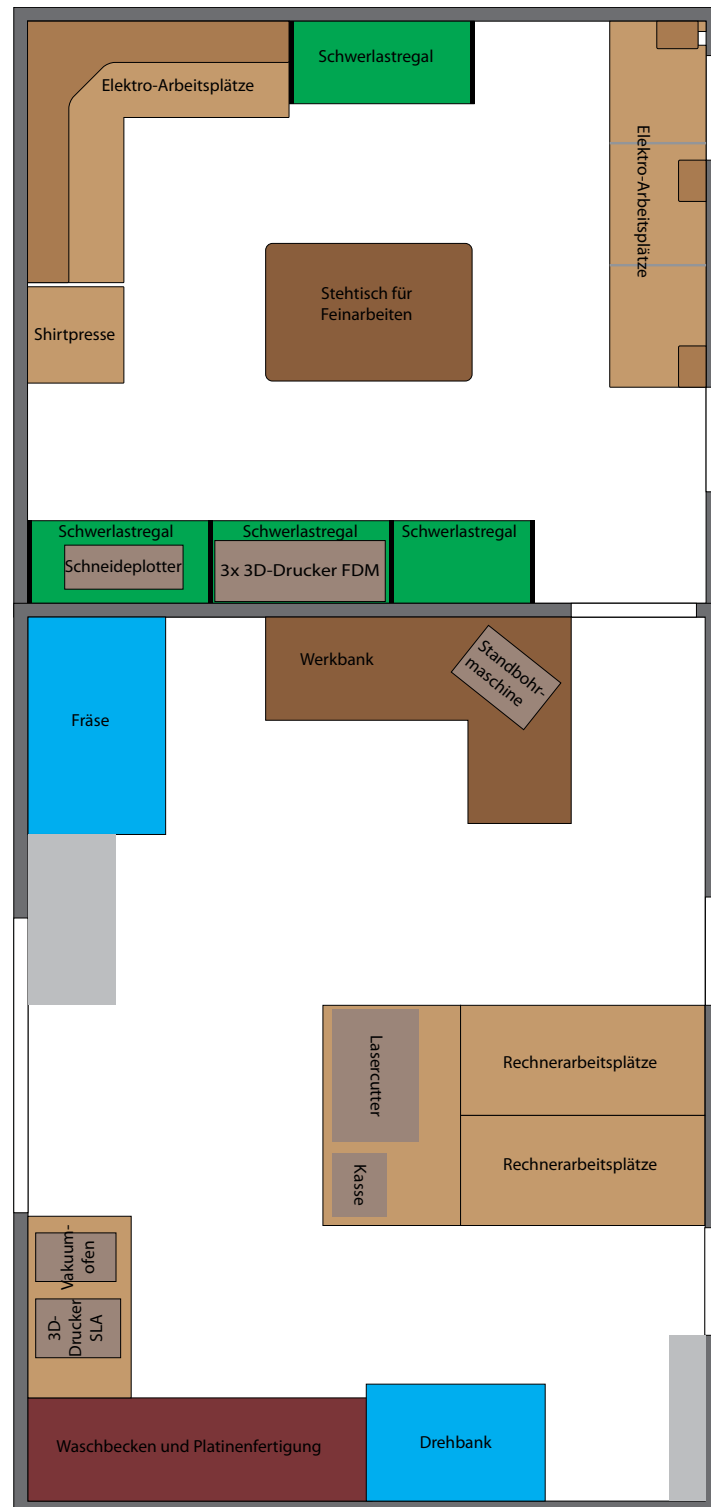




# Finanzierung

- Anschaffungen (zum Aufbau des Angebots)
  - Werkzeuge, Maschinen, Möbel und Computer
  - aus Studiengebühren, -zuschüsse und Spenden
- Laufende Kosten (zum Erhalt des „status quo“)
  - Nachkauf von Materialien
  - Verschleiß an Maschinen und Werkzeugen
  - Abschreibung
  - durch Materialverkauf und Nutzungsgebühr

# Räumlichkeiten





# Mithelfen





# Betreuer werden immer gesucht

- Eingewiesen und vertraut mit
  - Lasercutter
  - 3D-Drucker
  - Schneideplotter
  - Werkstattregeln
- OpenLab anbieten:
  - 2h pro Woche in der Vorlesungszeit **oder**
  - 2h alle zwei Wochen das ganze halbe Jahr
- **Gegenleistung: 24/7 Zugang**

## Auch sonst gibt es viel Arbeit

- Einkauf und Buchhaltung
- Workshops und Events (z.B. LNdW)
- Maschinenwartung
- Einweisungen schreiben
- Aufräumen und Putzen
- ...

# Fragen?

Führungen durch das FAU FabLab?





# Vielen Dank!