

STM32 Nucleo (code)  
LabsLand ARM Community  
Program a real ARM microcontroller with peripherals and low-power modes. Use an online IDE.

STM32 Nucleo (No IDE)  
LabsLand ARM Community  
Program a real ARM microcontroller with peripherals and low-power modes. Upload binary file.

Arduino robot (code)  
LabsLand  
Learn robotics and programming with a real robot based on a popular Arduino robotics platform

Arduino robot (visual)  
LabsLand  
Learn robotics with visual programming with a real robot based on a popular Arduino robotics platform

FPGA Laboratory  
LabsLand FPGA Community  
Learn Hardware design with FPGAs using LabVIEW and FPGA

Electronics - Five  
LabsLand Electronics Community  
Create and experiment with the five basic electronic components

Radiactivity  
University of Queensland  
Examine the intensity of radiation over distance and the effect of the inverse square law

Arduino Board (code)  
LabsLand  
Program a real Arduino Uno board and use basic peripherals

# REMOTE LABS - BRAINSTORMING AND CONCEPTION

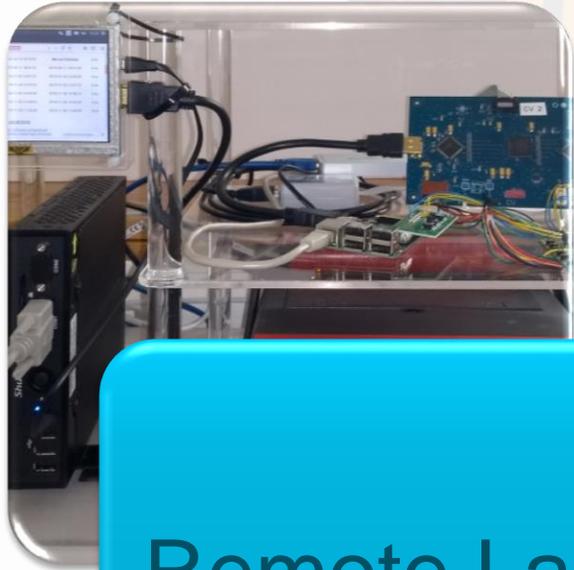
Intel DE2-115  
LabsLand FPGA Community  
Learn Hardware design with FPGAs using DE2-115

Intel DE1-SoC  
LabsLand FPGA Community  
Learn Hardware design with FPGAs using DE1-SoC

Arduino Board (visual)  
LabsLand  
Arduino Uno board with blocks and use peripherals

Kinematics  
RELLE (UFSC)  
Choose the tilt of the plane up to 90° and experience and analyze what happens to the ball

**Andrea Schwandt**  
**Institute of Visual Computing, Bonn-Rhein-Sieg University**



Remote Lab  
Examples

Require-  
ments for a  
Successful  
Remote Lab

Integration  
into your  
Course

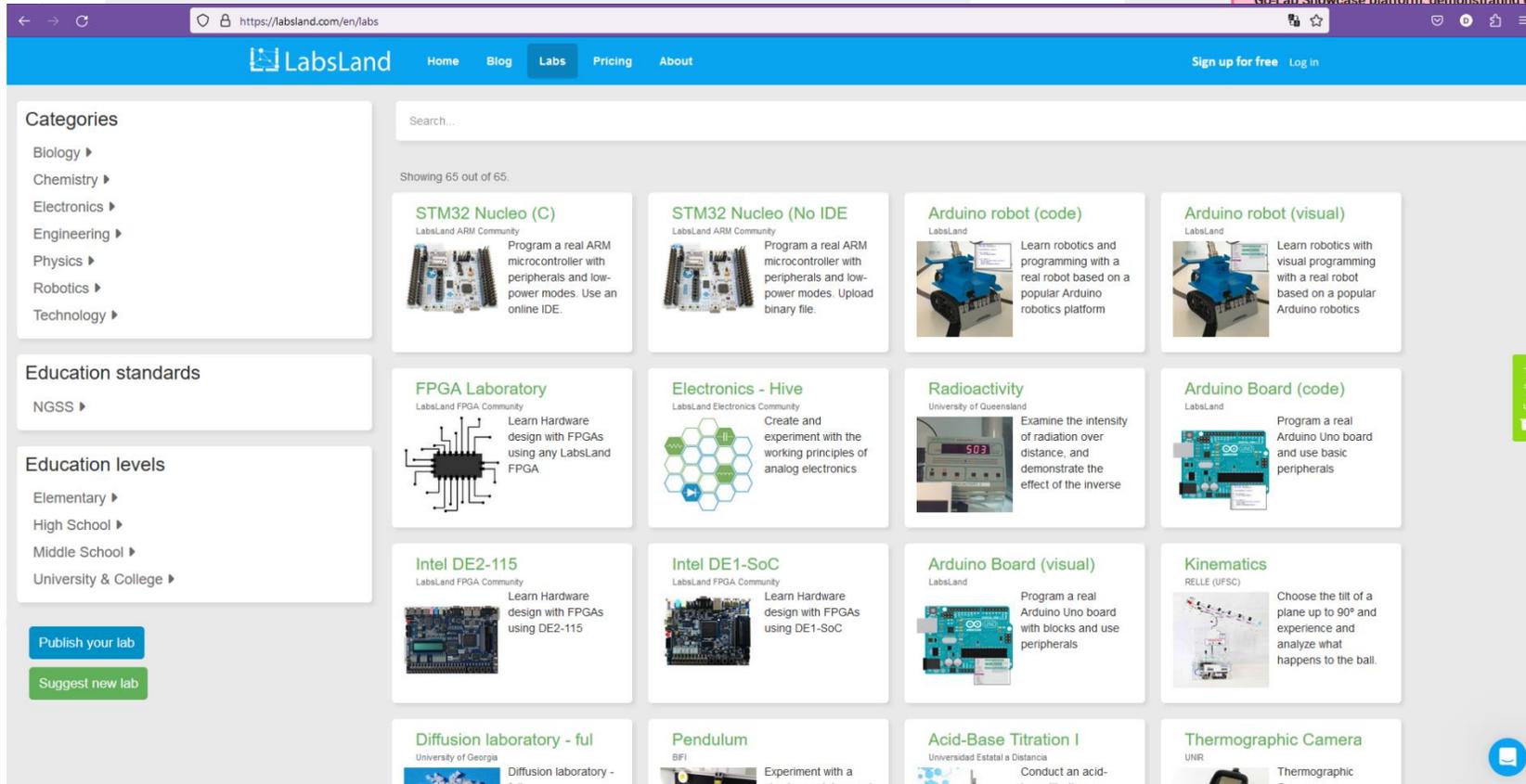
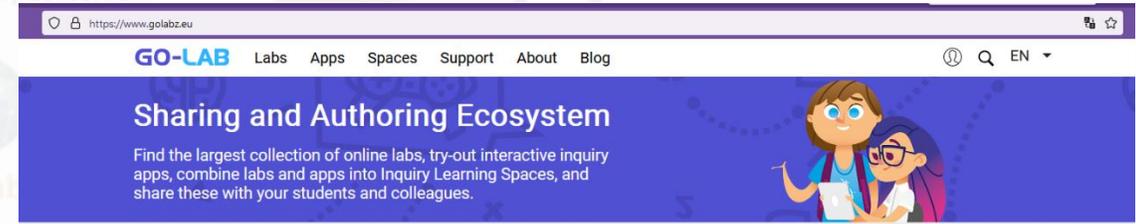


# REMOTE LAB EXAMPLES



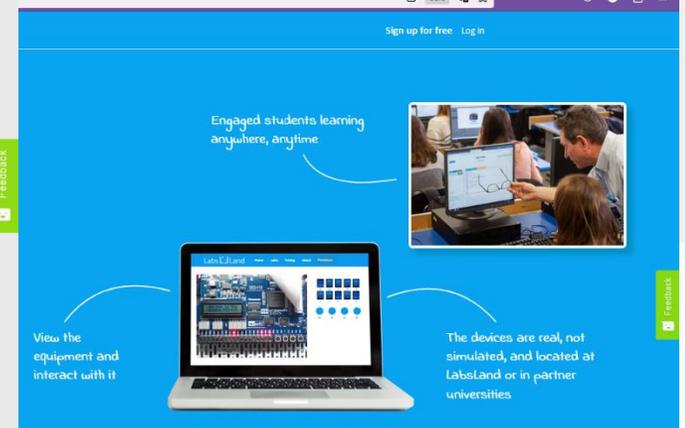
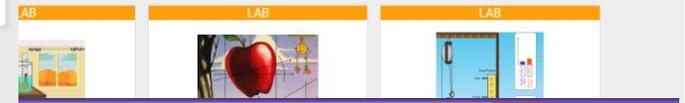


# Remote Labs worldwide...



The Go-Lab Initiative has officially finished in June 2023. The Go-Lab Sharing and Support platform (Golabz.eu) is now maintained as the Go-Lab Showcase platform, demonstrating Go-Lab's activities and achievements in the past ten years. This means that the content of only. It is no longer possible to create and publish Inquiry Learning Spaces (ILSs) on this find online labs and inquiry apps and access them on the providers' websites.

In your classroom, please refer to the new Authoring Platform Graasp (Graasp.org). It is updated ILSs from the old Graasp.eu to the new one (learn here how to save your work).



LabsLand is a global network of remote laboratories, that connects institutions to equipment located worldwide.





- Control Unit
- Welco
- How to us
- Lab Pres
- Visitor M
- Image v
- GOLDI

**REAL - Remote Engineering and Application's Laboratory**

<b>Task Description</b>	Remote control, maintenance and configuration	
<b>Specification</b>	state machines state machine networks SPS notations c (Pascal, Baisc) code	
<b>Synthesis</b>	<div style="display: flex; justify-content: space-around;"> <div>Software Synthesis</div> <div>Interface Synthesis</div> <div>Hardware Synthesis</div> </div>	
<b>Implementation</b>	<div style="display: flex; justify-content: space-around;"> <div>  CPLD / FPGA         </div> <div>  Micro Controller         </div> <div>  SPS         </div> </div>	
<b>Models</b>	<div style="display: flex; justify-content: space-around;"> <div>  3-axis table         </div> <div>  high bay racking         </div> <div>  elevator         </div> <div>  production line         </div> </div>	

Fig 2.: Overview of the GOLDI system

## MIXED REALITY IN LABS



Virtuelle Welten alleine oder im Team erkunden und Aufgaben lösen.

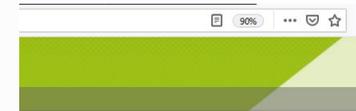
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## TELEOPERATIVE PRÜFZELLE



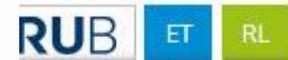
Untersuchen Sie unterschiedliche Materialverhalten unter verschiedenen Belastungszuständen.

» Weiterlesen



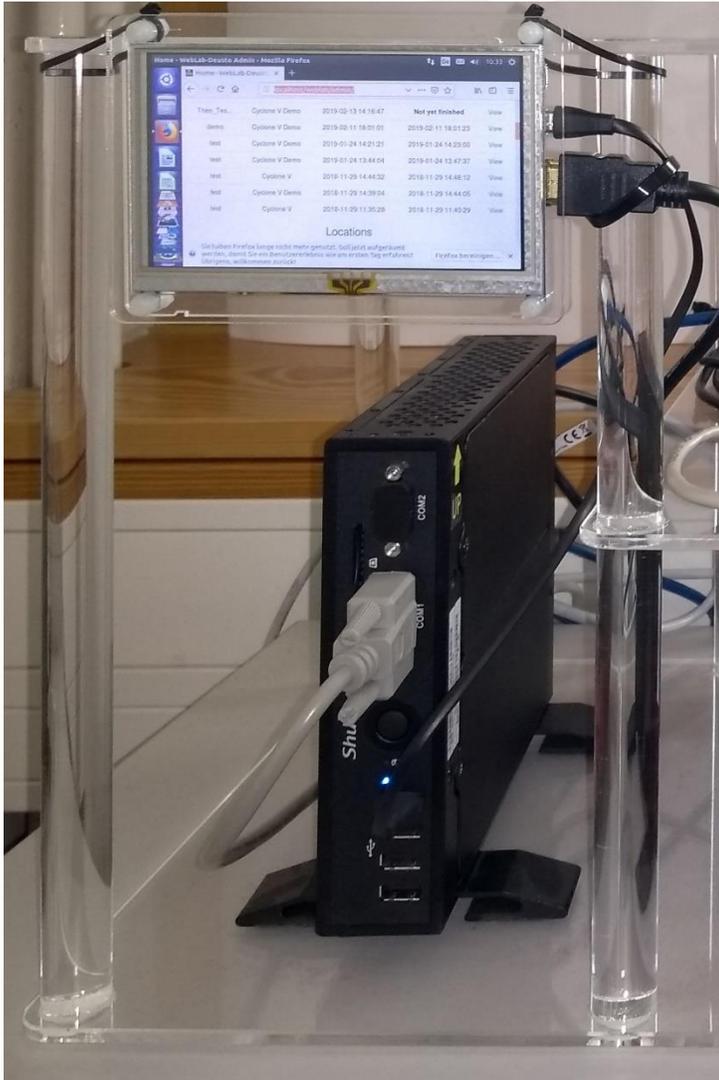
NACH HAUSE  
HREIBTISCH  
DIE COUCH!

## TELROLLENPRÜFSTAND ELEKTROFAHRZEUGE



An einem echten Auto testen, wie Elektromobilität funktioniert.

» Weiterlesen





## Cyclone V Demo (FPGA experiments)

[Finish](#)

Start Experiment 1: Inverting Signals

Start Experiment 2: Sharpening Filter

Start Experiment 3: Lane Detection

FPGA Core Current:

# 43.64 mA

(Core Supply Voltage is 1.1 V)

⏪
⏩
⏴
⏵
Select Input Image
⏴
⏵



Durchsuchen... Keine Datei ausgewählt.

[Upload your own input image now](#)



SW 0\*  OFF

SW 1\*  OFF

SW 2\*  OFF



00:00:50

\*only active in full experiment for registered users

Program Default Design

Update Output Image and Core Current

Update Core Current Only

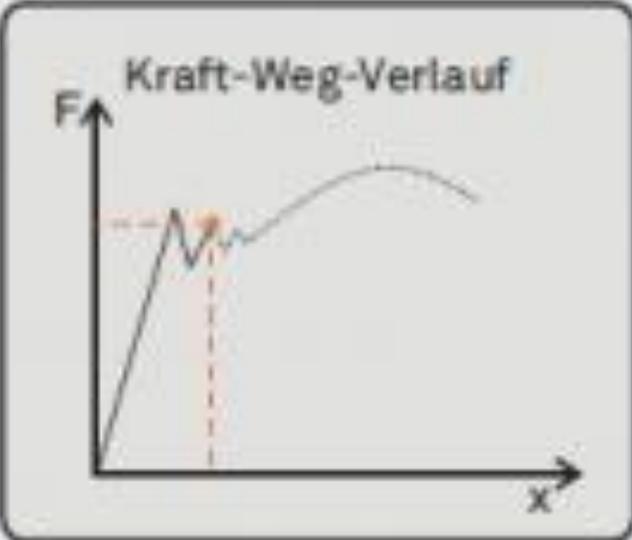


Benutzer-Interface

Live-Bild



Kraft-Weg-Verlauf



Messdaten-Export

Kamera-Auswahl

Parameter-Anpassung



Global Online Laboratory Consortium



# WHAT ARE THE REQUIREMENTS FOR A SUCCESSFUL REMOTE LAB?

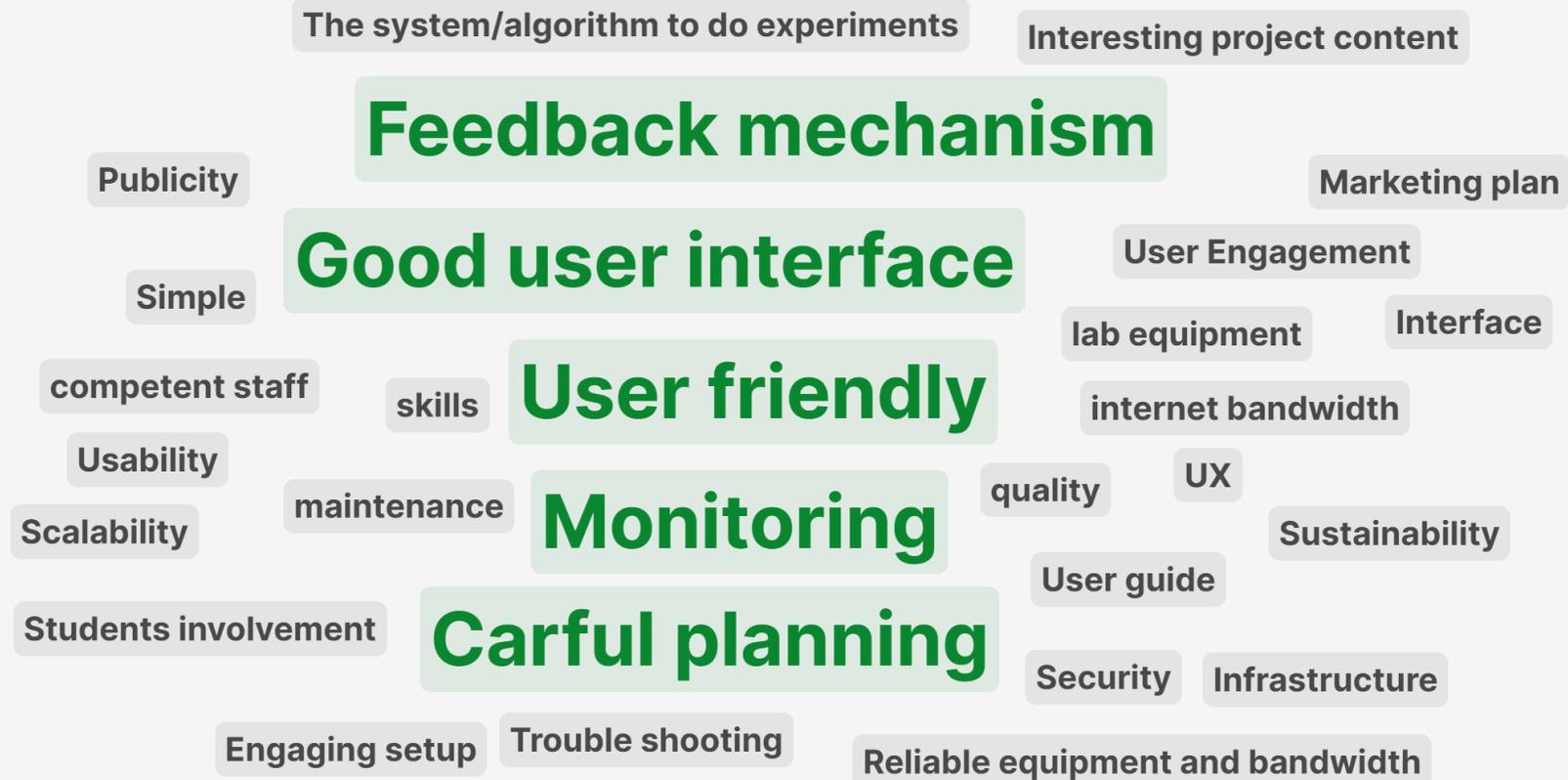


Please, take a view minutes to think about it and discuss it with your colleagues!

*FPGA Vision*



## What are the requirements for a successful Remote Lab?



# Some Requirements for a Successful Remote Lab

- straightforwardness of the user interface
- high and reliable availability
- easy accessibility

• **high level of experimental freedom**

*FPGA Vision*





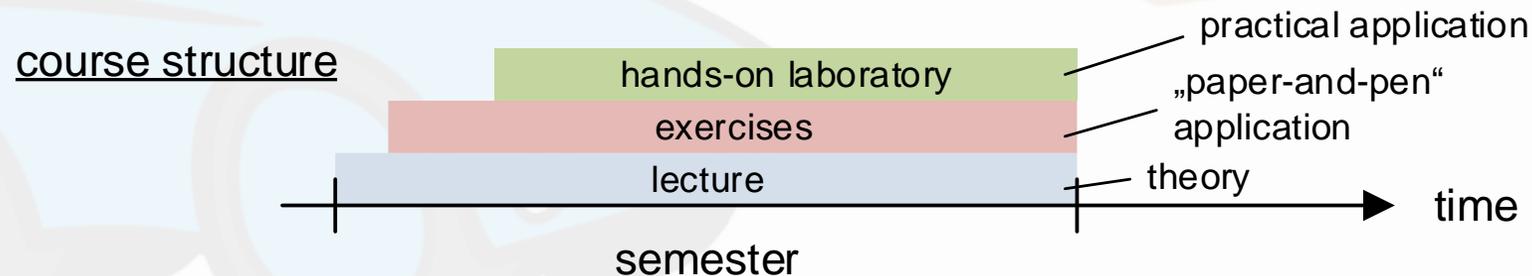
# INTEGRATION INTO YOUR COURSE



# Approach to Using the Remote Lab and Video Lectures

## Course structure

- Teaching course often have lecture, exercises and hands-on labs
  - Exercises and hands-on labs start after some theory
  - Lecture and exercises can be combined or lecture includes interactivity



- Remote lab and video lectures provide additional insight for students
  - ⇒ Supplemental topic corresponding to 1 or 2 weeks of course (with 3 ~ 6 hours per week)
  - ⇒ Optional content as elective or for advanced students



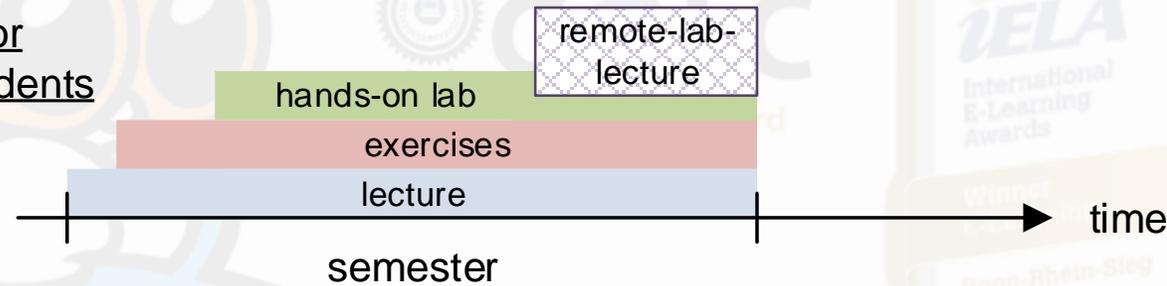


# Scenarios for Usage in Course

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remote-lab-lecture = remote lab and video lectures

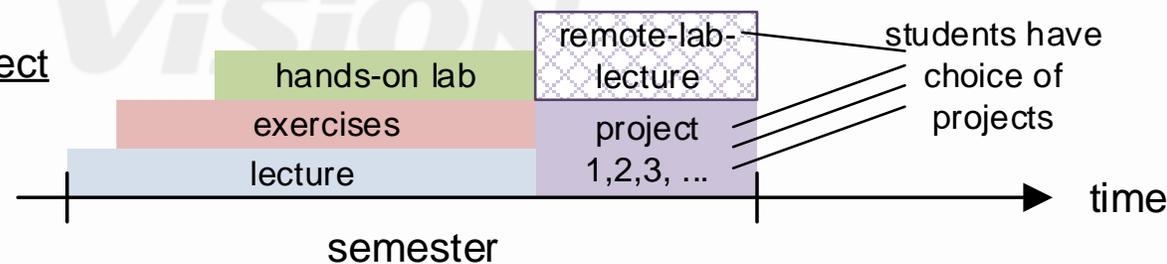
optional for advanced students



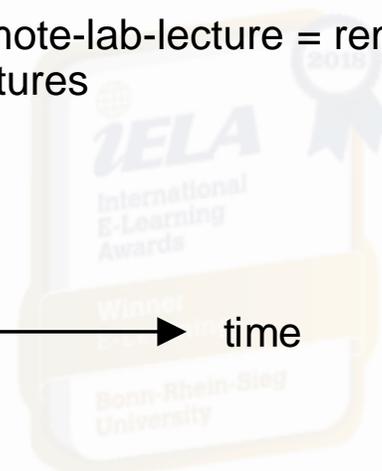
optional content after semester



final design project



students have  
choice of  
projects



FPGA Vision



# ... IT'S TIME FOR A FIRST BRAINSTORMING

...

[https://miro.com/app/board/uXjVMioJdtk  
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FPGA VISION