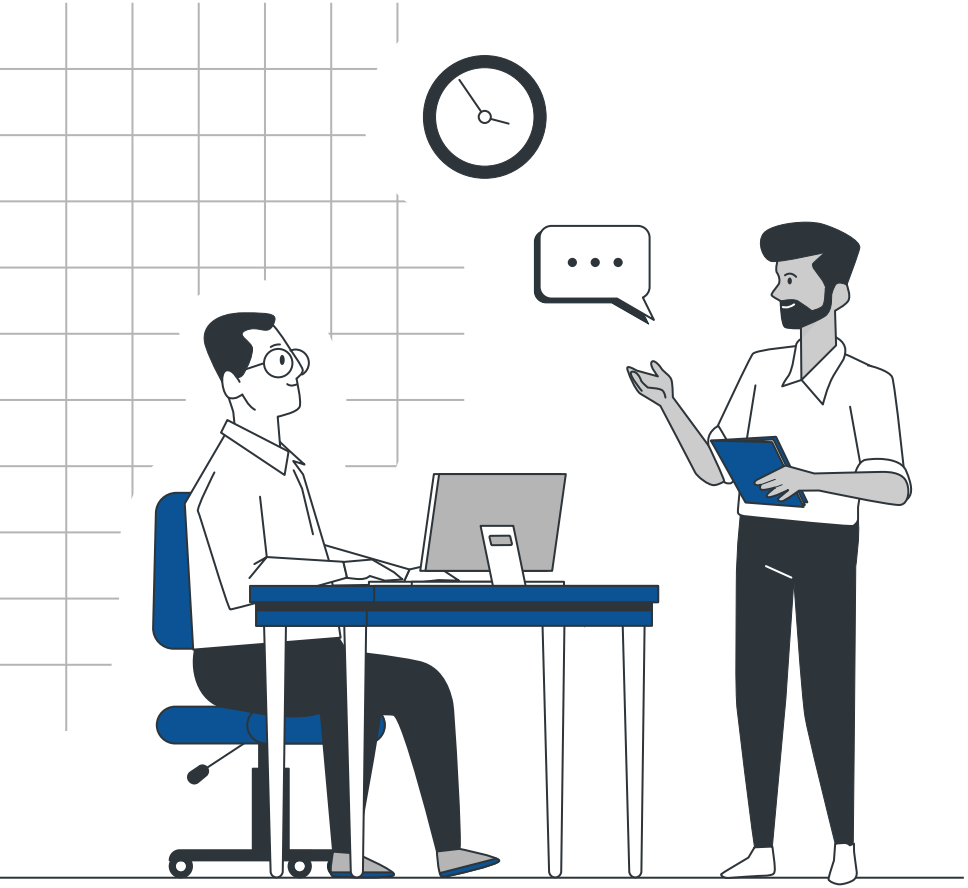


FINAL PRESENTATION

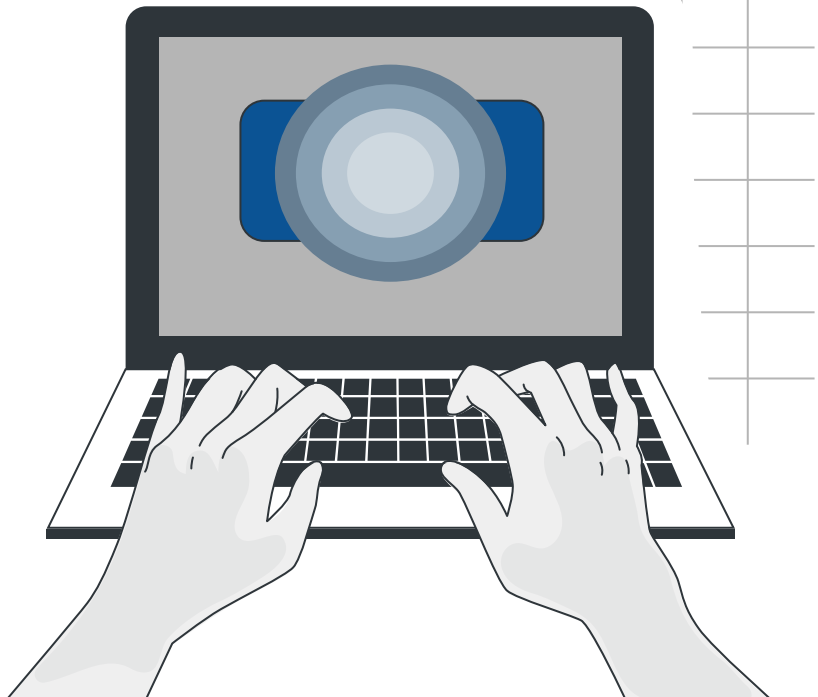
Fabrication Lab 2023

UniLock

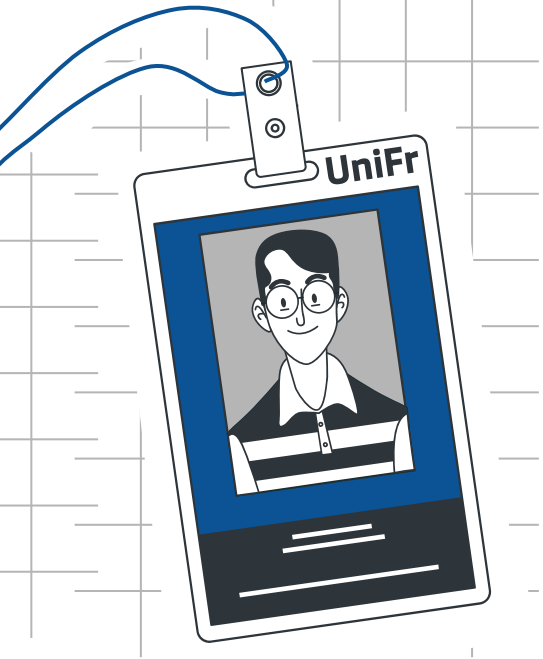
Jacopo Caratti, Nicholas Kaegi

01

Intro



How to access the FabLab?



Current solution

Campus Card

- physical accesses;
- student identity card;
- library card
- electronic credit card for specific services
- access to University sport;
- proof to obtain users discount

UNIL | Université de Lausanne

UNIVERSITÄT BERN

Université de Neuchâtel

External collaborators

➔ Obtaining one is a very slow process

Our idea

Computer Vision

Secure storage

Feedbacks

Usability

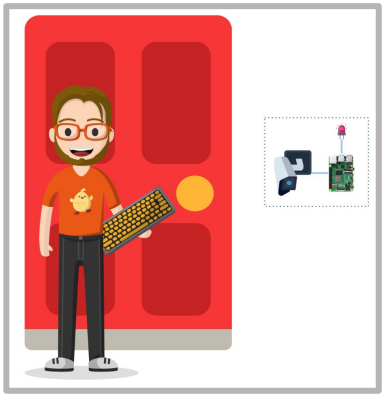
Secure access

Easy-to-use, easy-to-manage, no privacy concerns, computer-vision

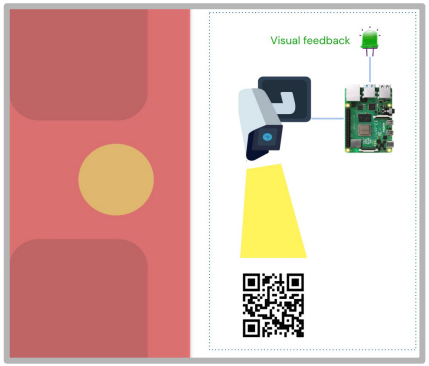
02

UniLock

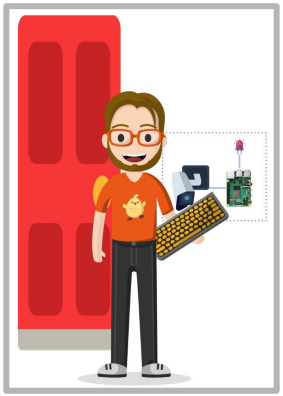
Workflow



Approach UniLock system



Generate, scan and validate temporally QR code



Access the area

Leave and lock the area

A picture is worth a thousand words...

– Tess Flanders, newspaper editor

...what about a video?

– Jacopo Caratti, currently unemployed

03

Demo

04

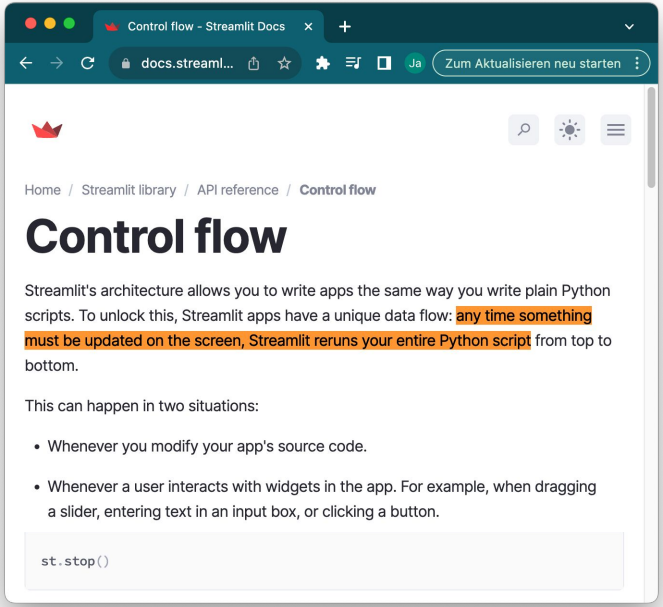
Technical challenges

Web App

Streamlit

Open-source Python library for building and deploying custom web apps. Compatible with major Python libraries.

Web app



Streamlit

PROBLEMS

Particular control flow, no backend development, database management, URL routing

Web app

Better idea for the webapp

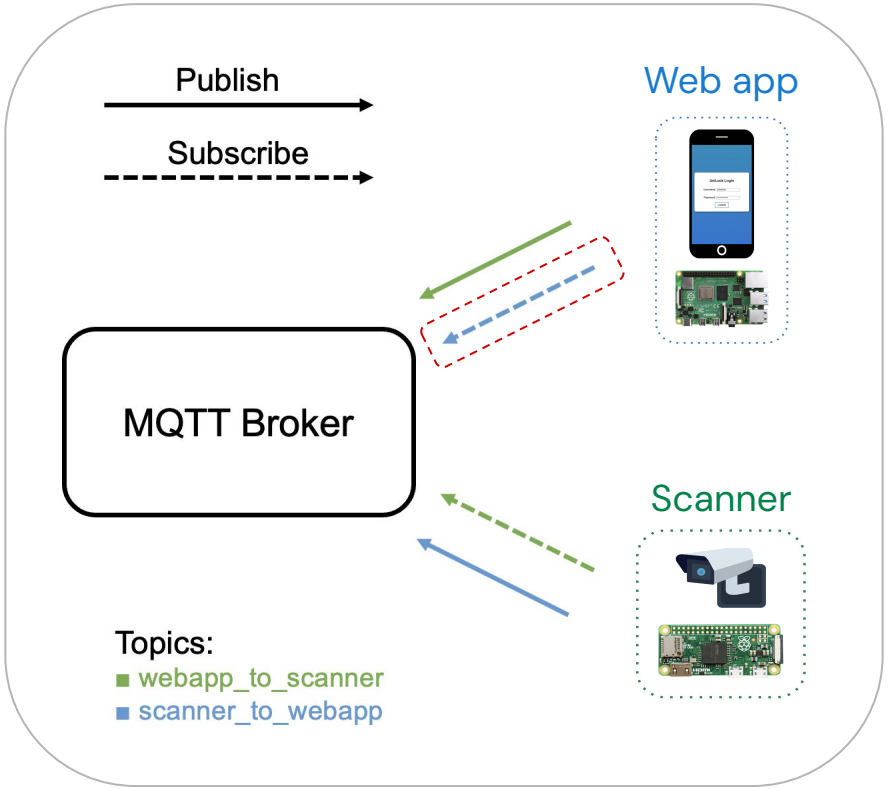
→ full-stack framework for robust, scalable web apps with extensive functionalities

Lock

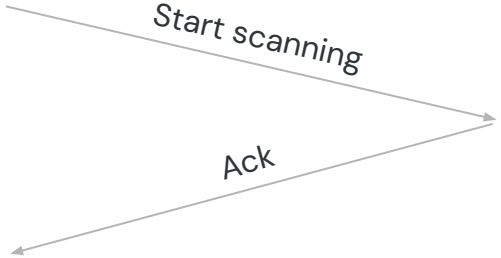
UniLock

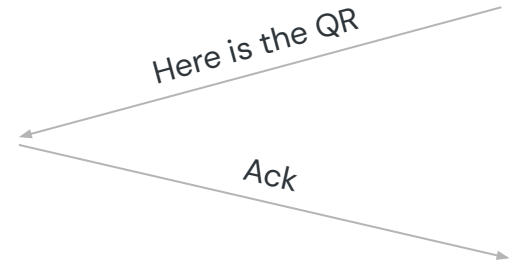
Statistics

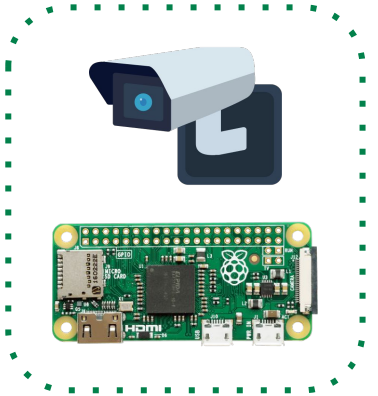
Standardize communication among the 3 projects



PROBLEM Broker fails to deliver scanned QR to web app for validation (Django vs MQTT)



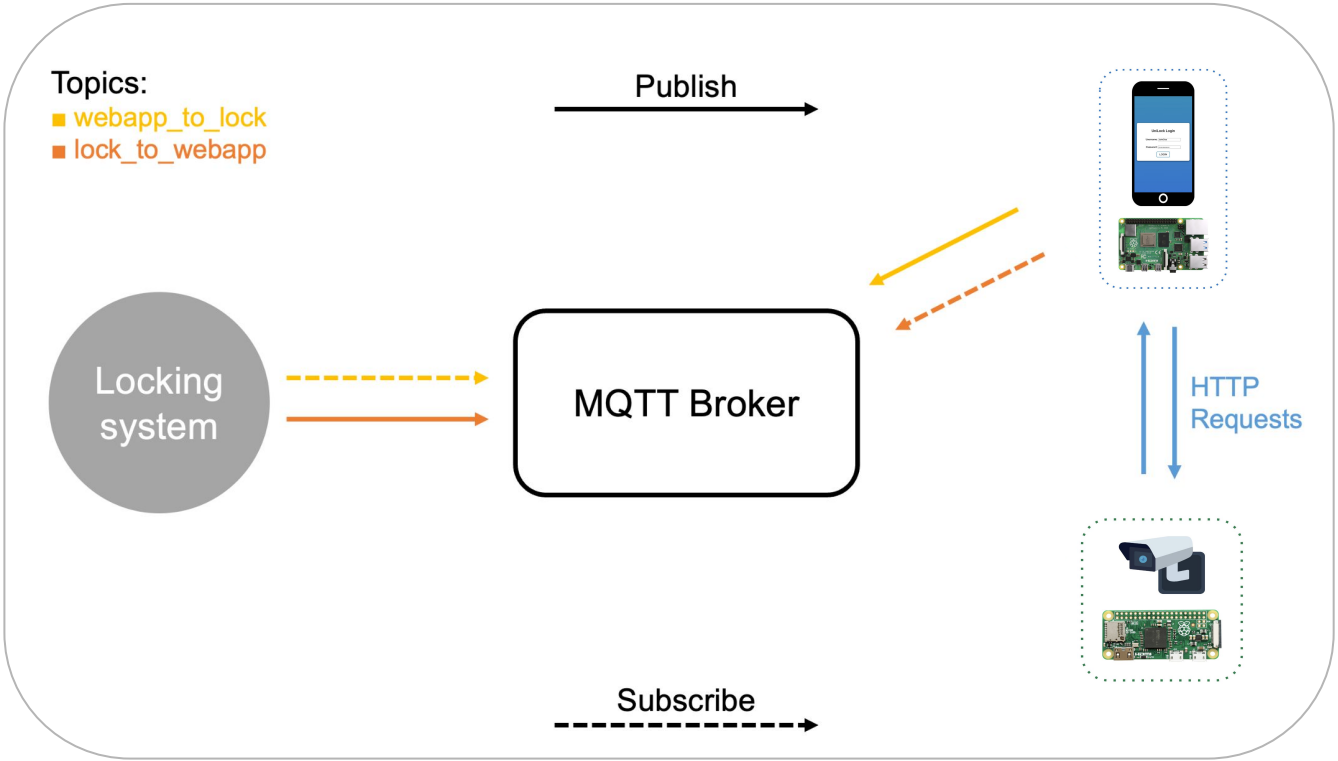




HTTP Requests

SOLUTION HTTP for internal communication

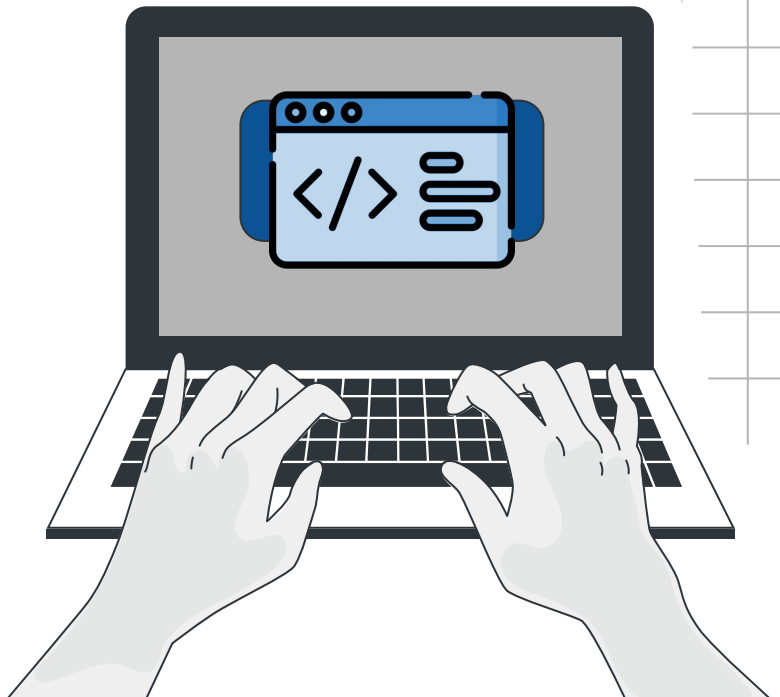
Communication

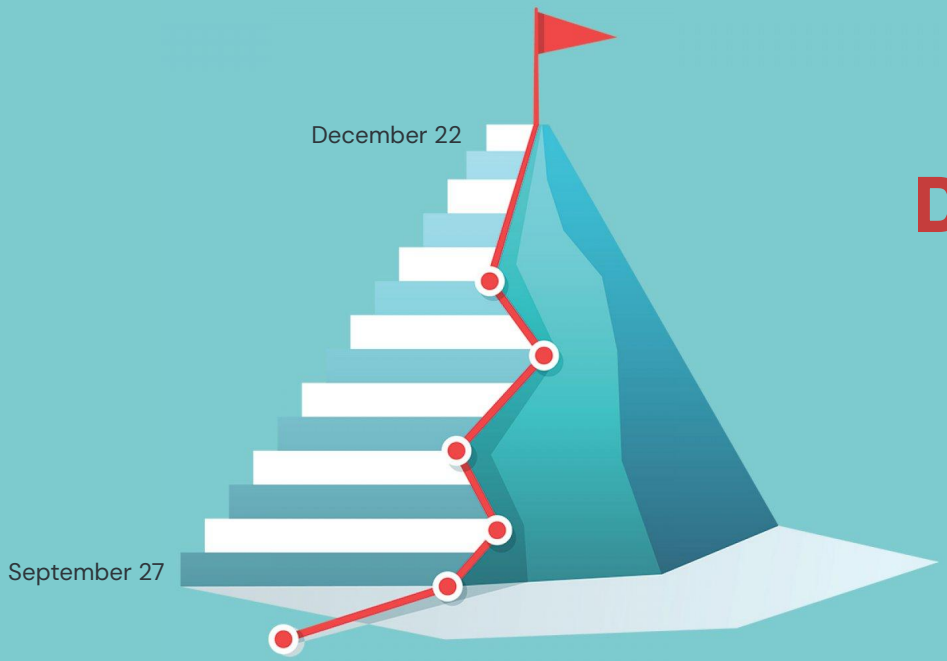


FINAL SETUP MQTT for external communication | HTTP for internal communication

05

Time Trade-offs



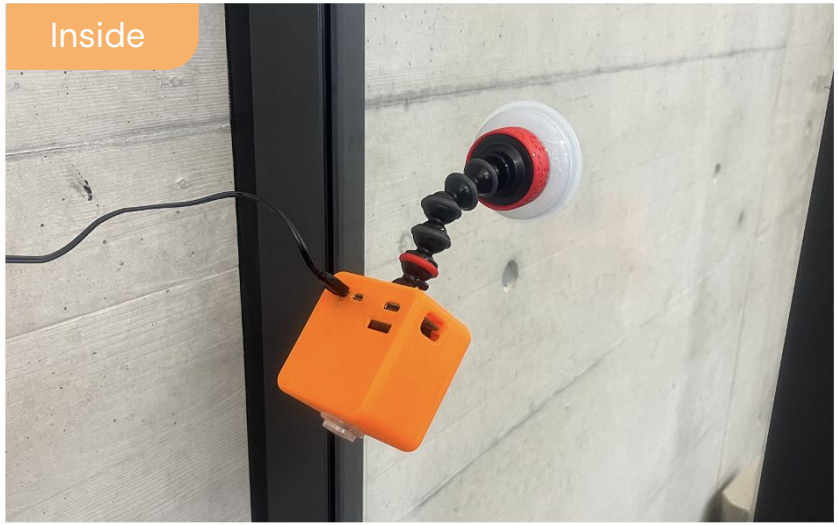


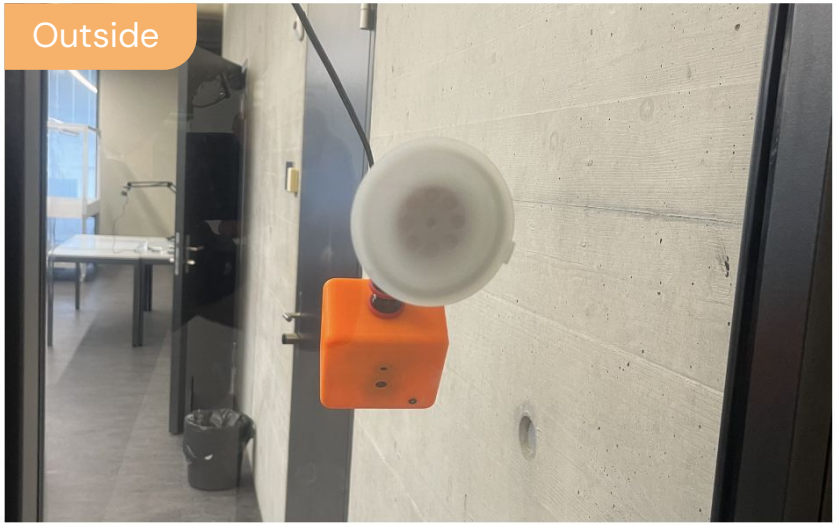
Main goal

Deliver a working system

Careful planning,
keeping the system easy,
specific design choices,
focusing on main components.

Very good for prototyping but...





Adjustable positioning and (limited) stability.

over time

Suction cup

- plastic flats out
- vacuum weaken
- cup's seal to the surface fail
- not stick to all surfaces

→ More permanent/fixed setup

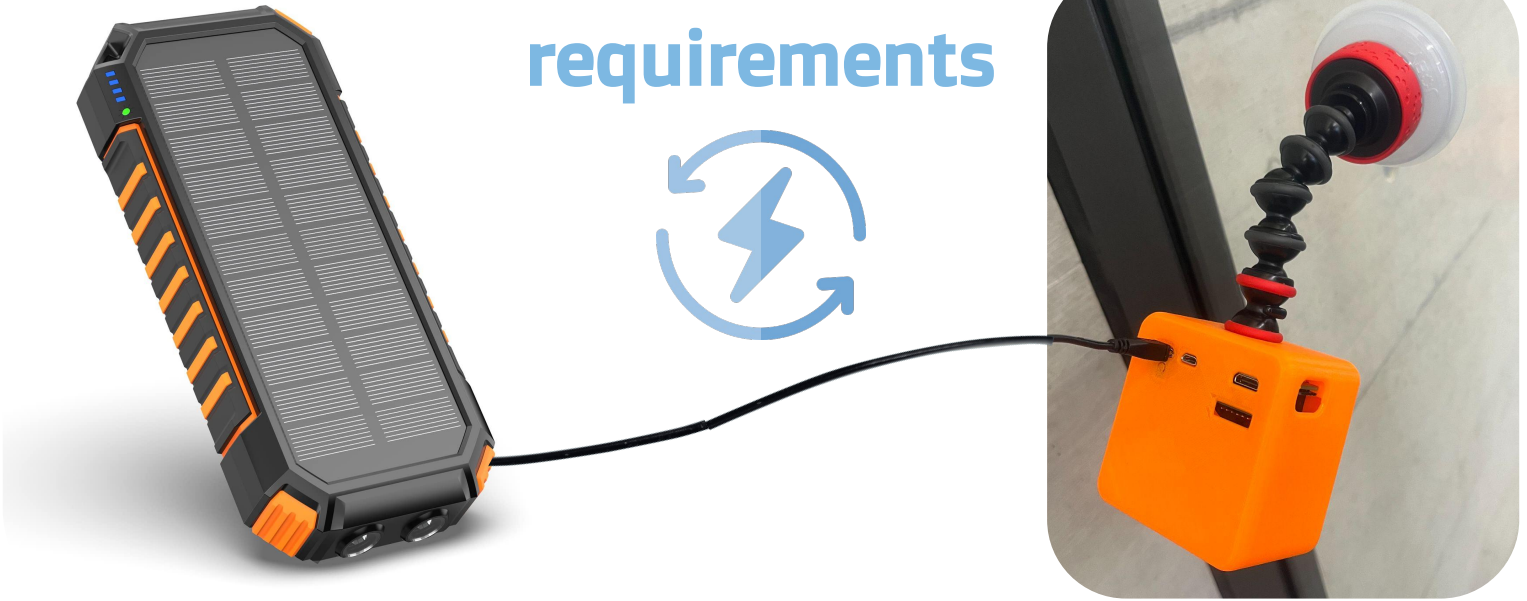
Case

Exposed SD card

Easily removable while prototyping,
not meant for development.

→ SD card inside the case + lockable
with screws

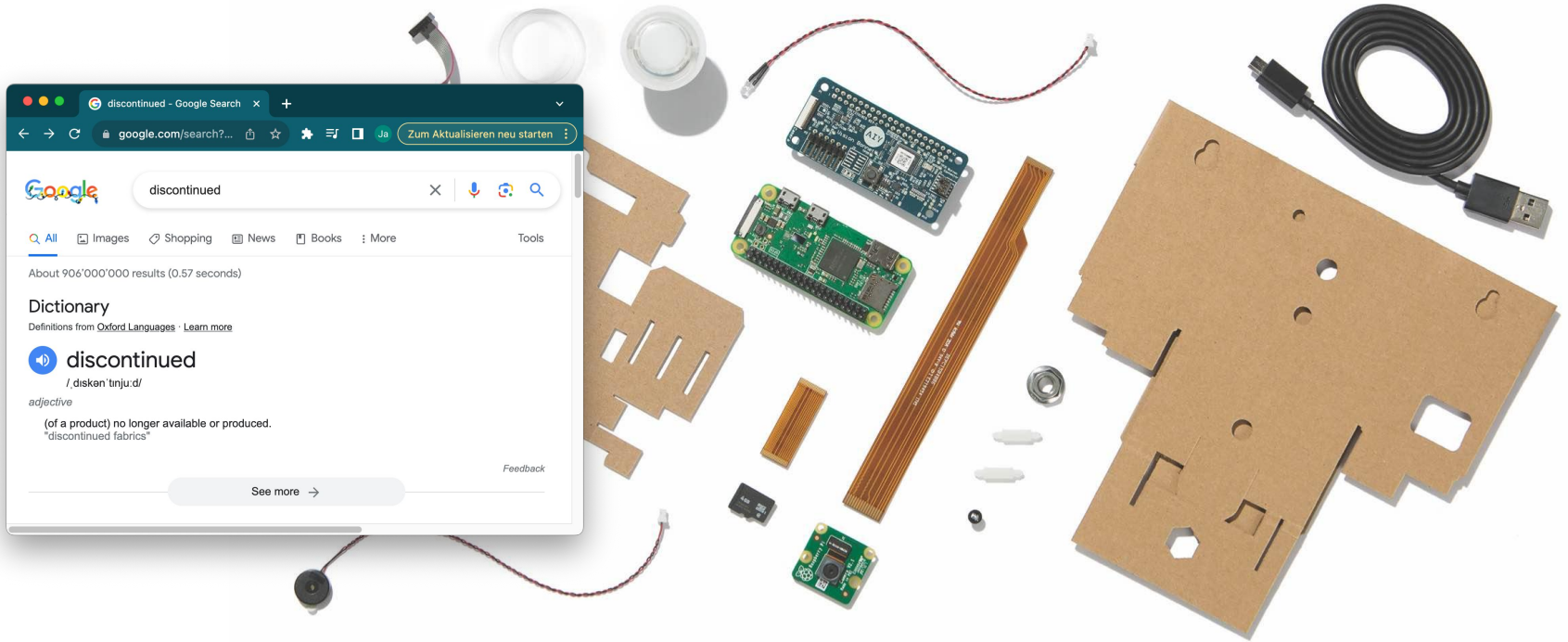
Power requirements



The battery is an additional cumbersome external component.

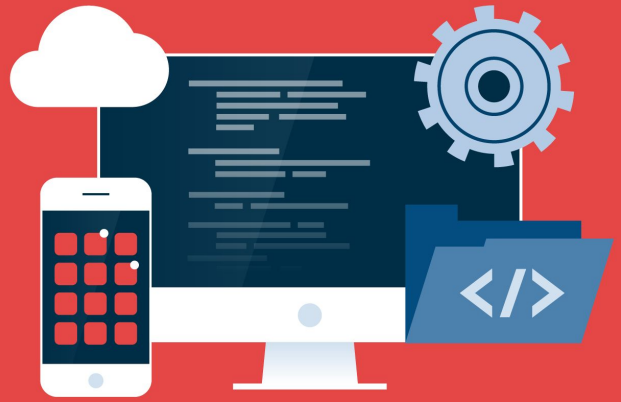
→ more compact case, attach to electricity

Case



Google AIY Vision Kit

→ modest hardware needs: separate procurement and assembly of individual components.



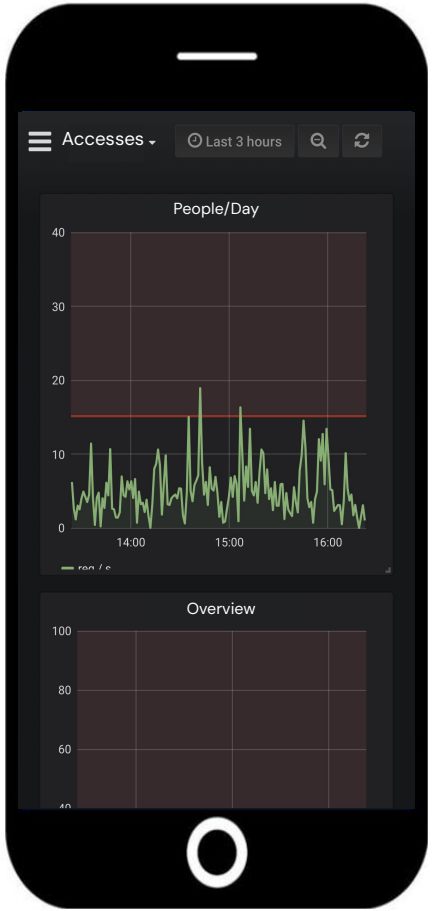
The professor has permanent access.

The student has access only for the current semester.

The external collaborator has access only for the visit period.

Access valid until a specific date

Web app



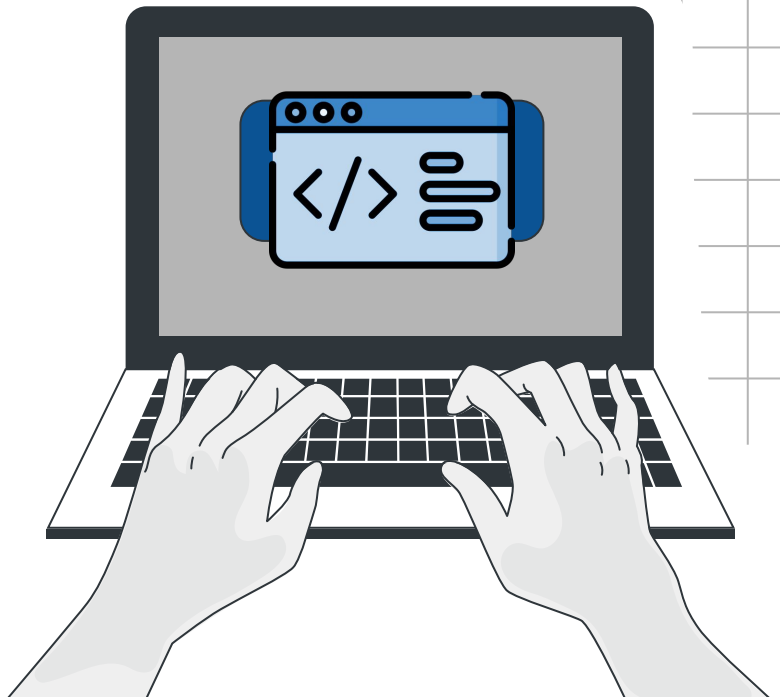
Analyze current situation directly from the admin panel.

Include statistics in the web app

Web app

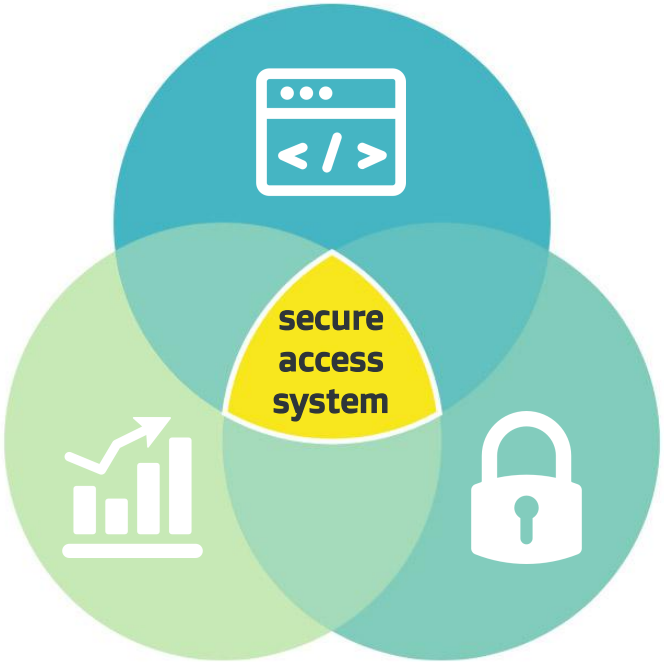
06

UniLock value

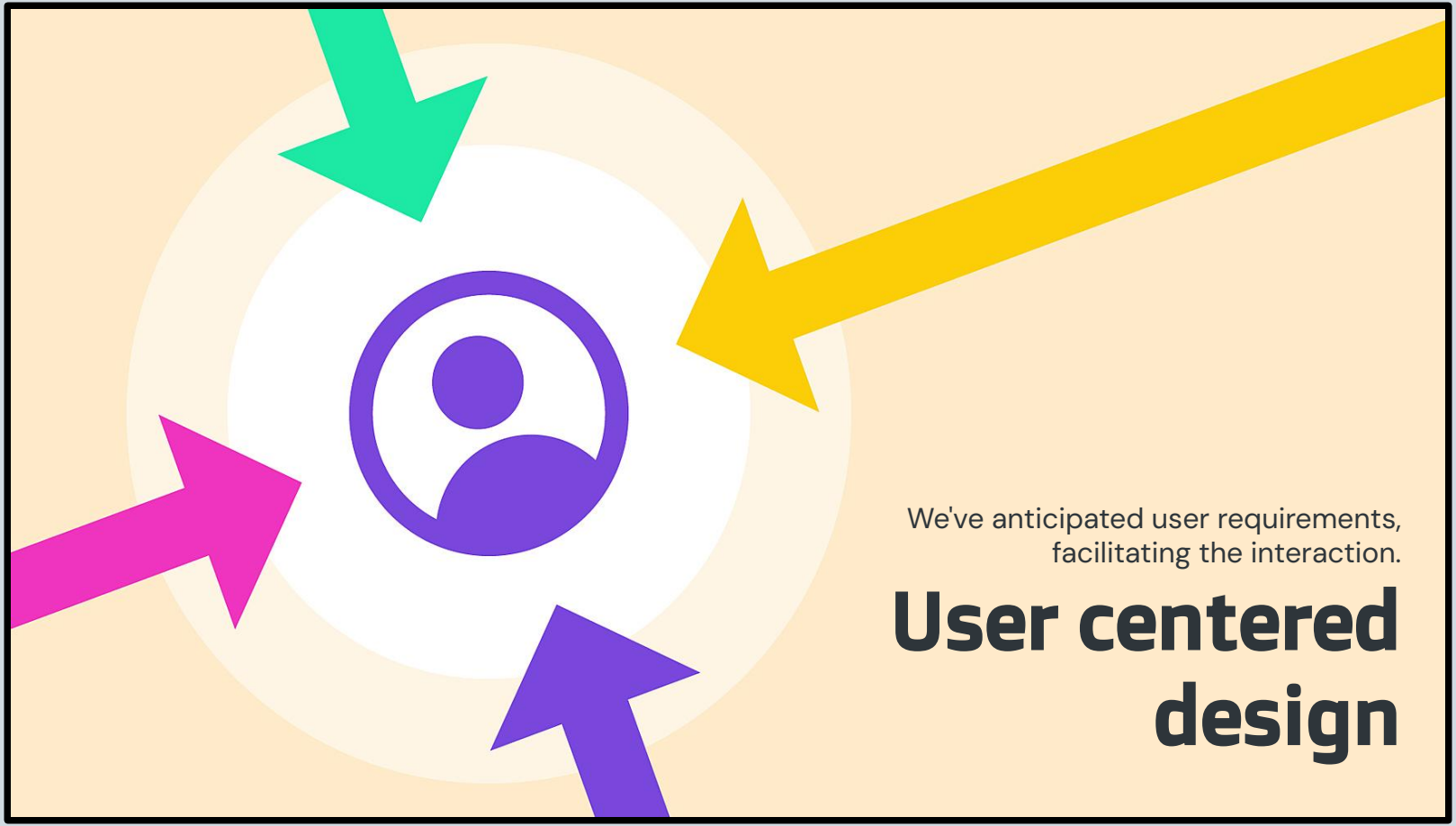


Facilitate user's workflow and interaction

Collect statistics and process them

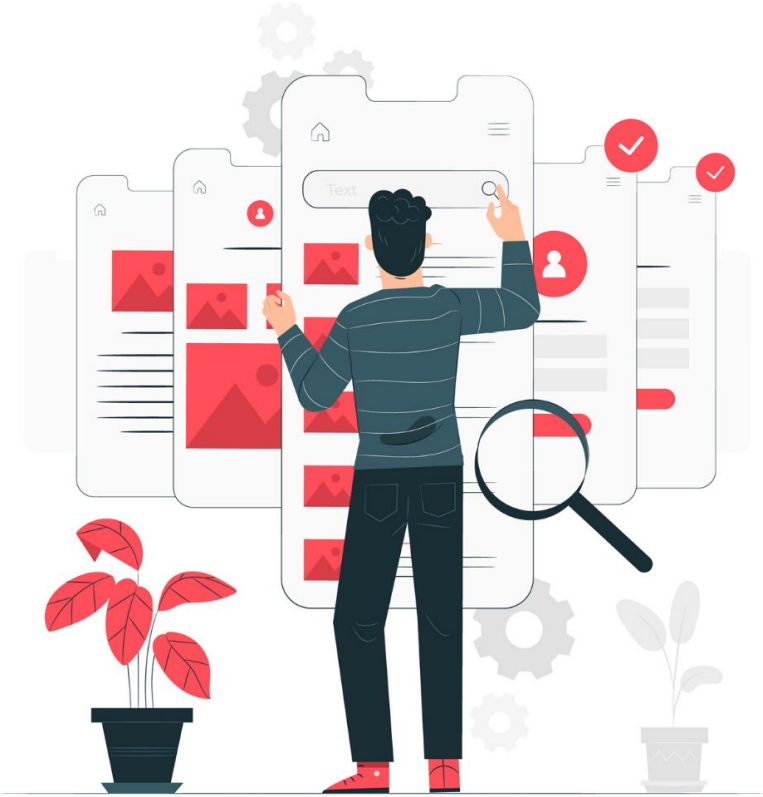


Mechanical door's interaction



We've anticipated user requirements, facilitating the interaction.

User centered design



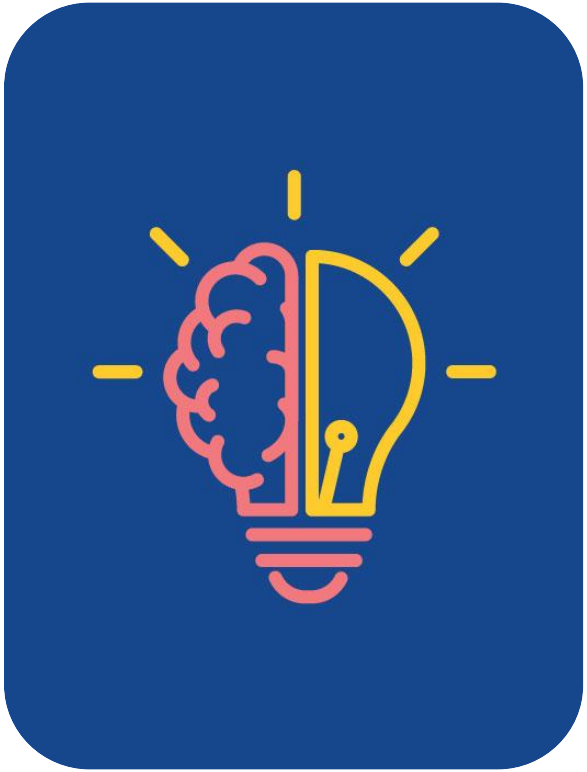
USABILITY

- easy-to-use for users
- easy-to-manage for administrators

Independent and potentially applicable in various environments.

Knowledge acquired

UniLock taught us the essence of teamwork, exploring new tech, brainstorming solutions, embracing experimentation and learning from failures.



Thanks

Do you have any questions?