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Utilising IoT Sensors to Understand the Environmental Performance of NHS Eye Clinics

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Content

1. Context
2. Device design
3. Data infrastructure
4. Initial results
5. Challenges

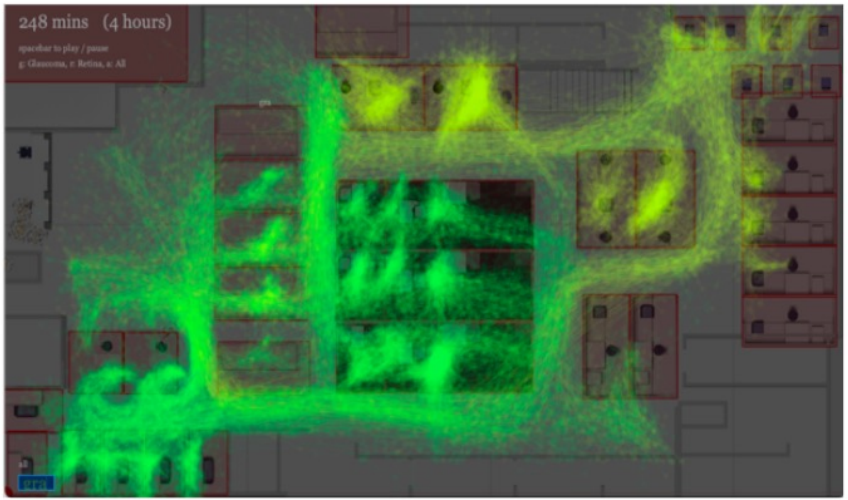
1

Context

Moorfields Eye Hospital NHS Foundation Trust

Brent Cross, London

Phase 1: Tracking patients



- On behalf of The HERCULES Consortium
- Funded by the NIHR Biomedical Research Centre at Moorfields Eye Hospital

(Now) Phase 2: Environmental monitoring

Moorfields Eye Hospital NHS Foundation Trust

Brent Cross, London

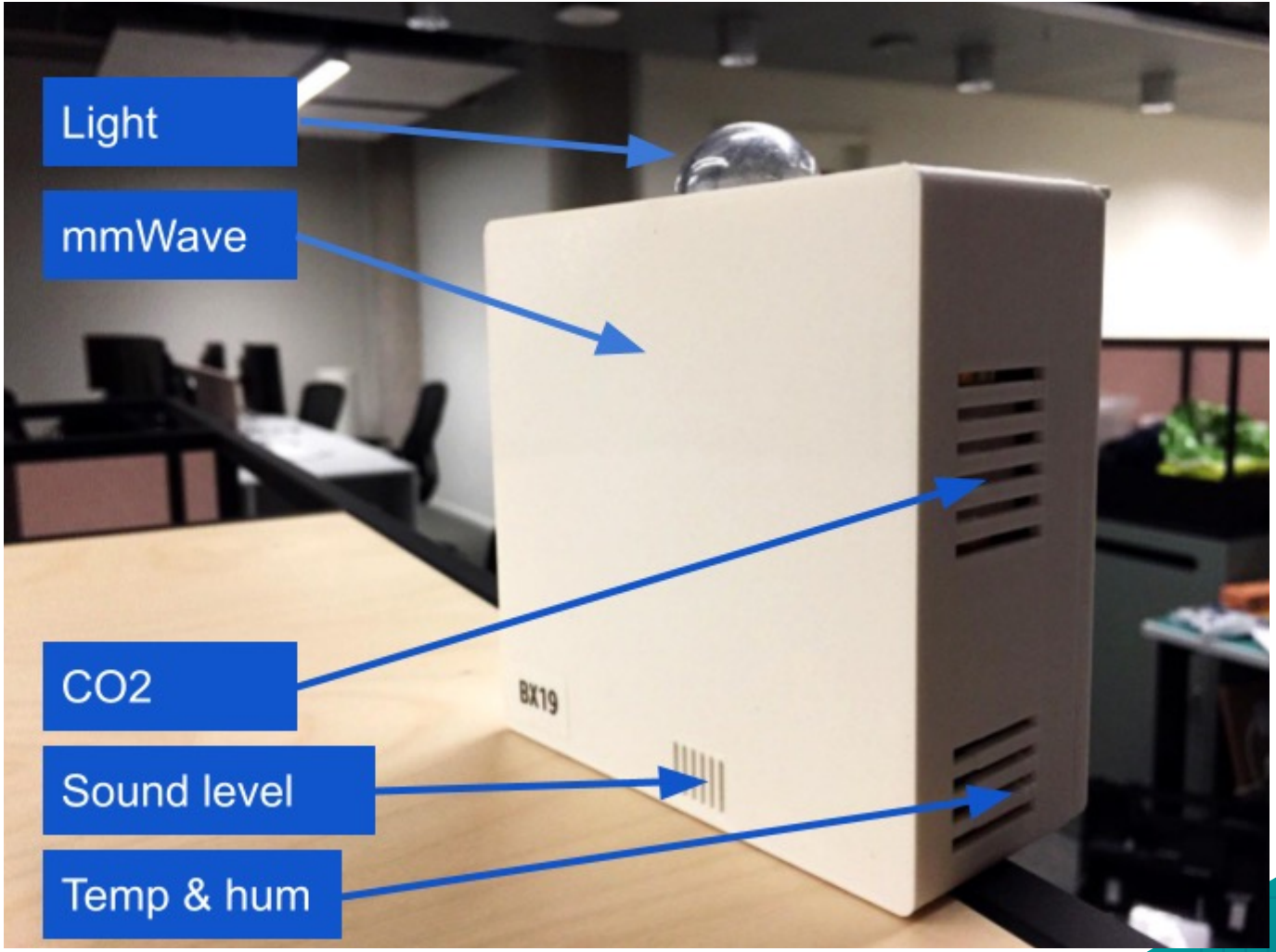
20

Deployed Sensors

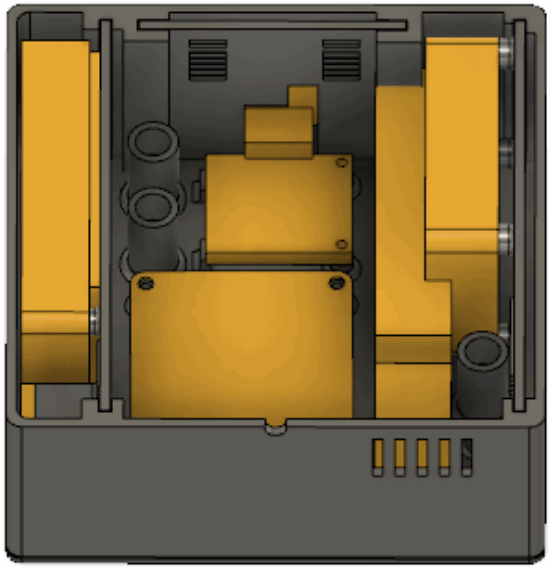
Wi-Fi connected
~50% Ceiling mounted
~50% Wall mounted

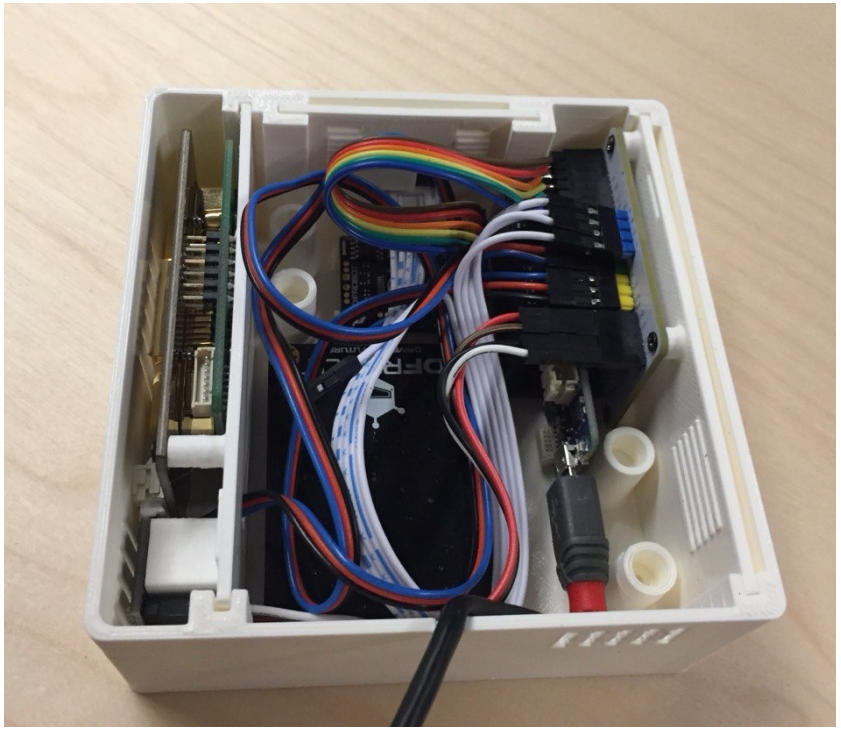
2

Device Design


Light
mmWave
CO2
Sound level
Temp & hum
BX19

Internal sensor positioning



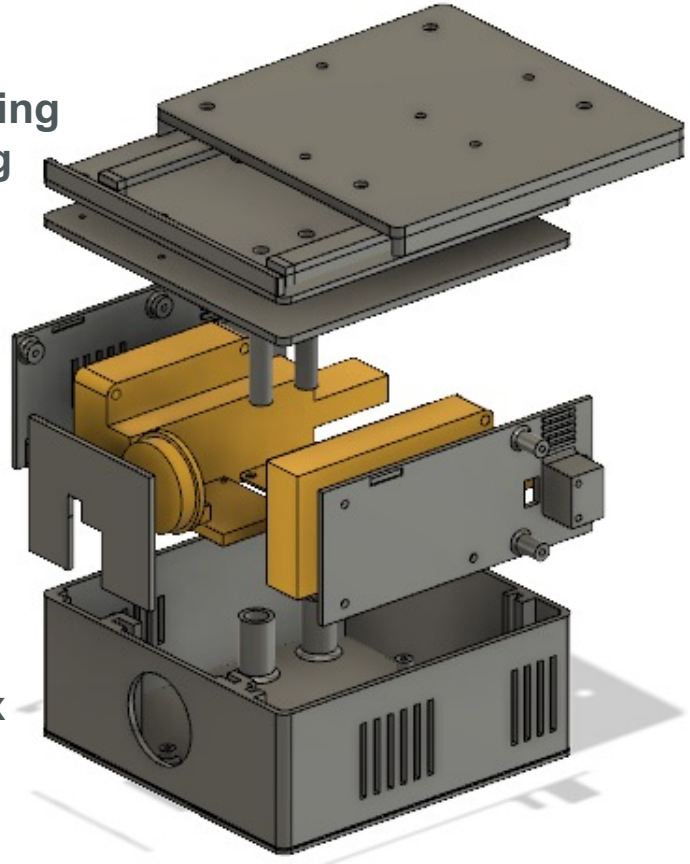


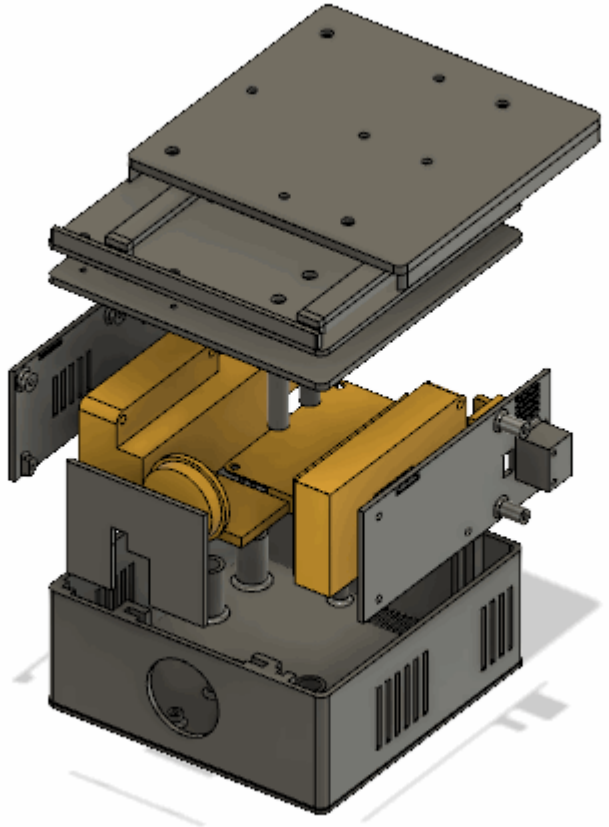
- Based on Arduino MKR Wifi 1010
- Custom PCB

Wall/Ceiling mounting

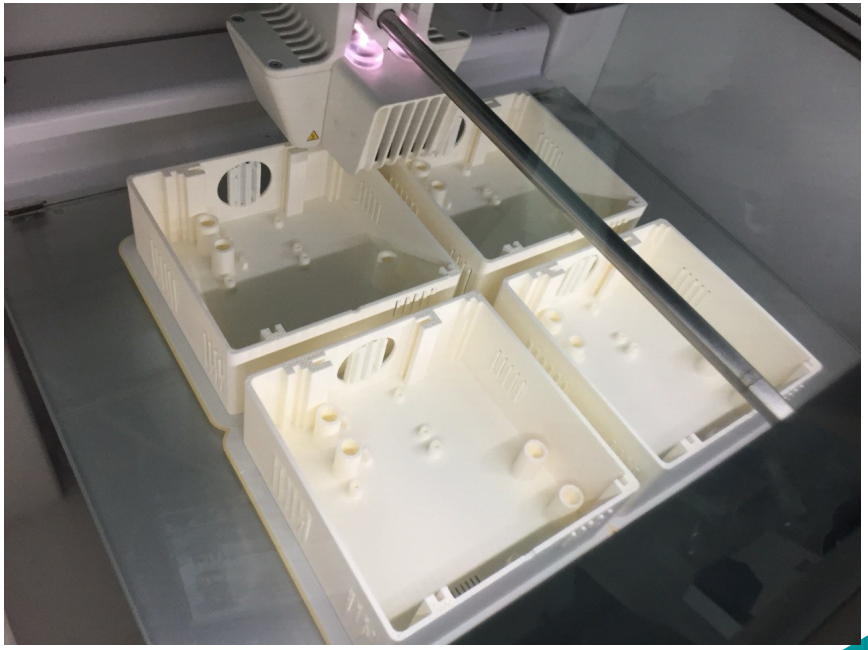
Sensor holders

Main box





3D Designed Using Fusion360



3D Printed & assembled at UCL East

Ceiling and wall mounting

COACH after assembly and deployment

3

Data Infrastructure

Wi-Fi

MQTT

Internet

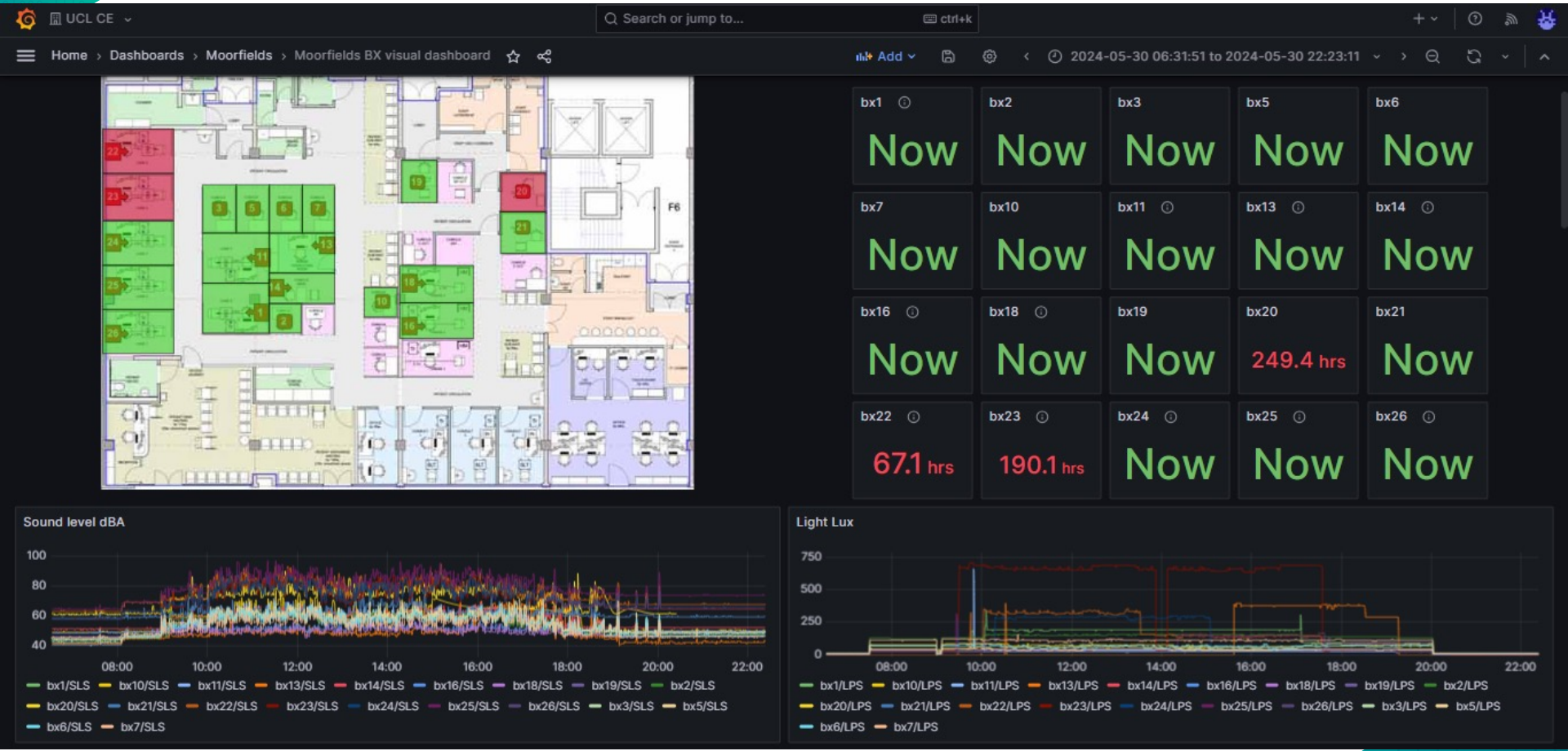
MQTT Broker

influxdb

Grafana

Self-hosted Infrastructure

Infrastructure

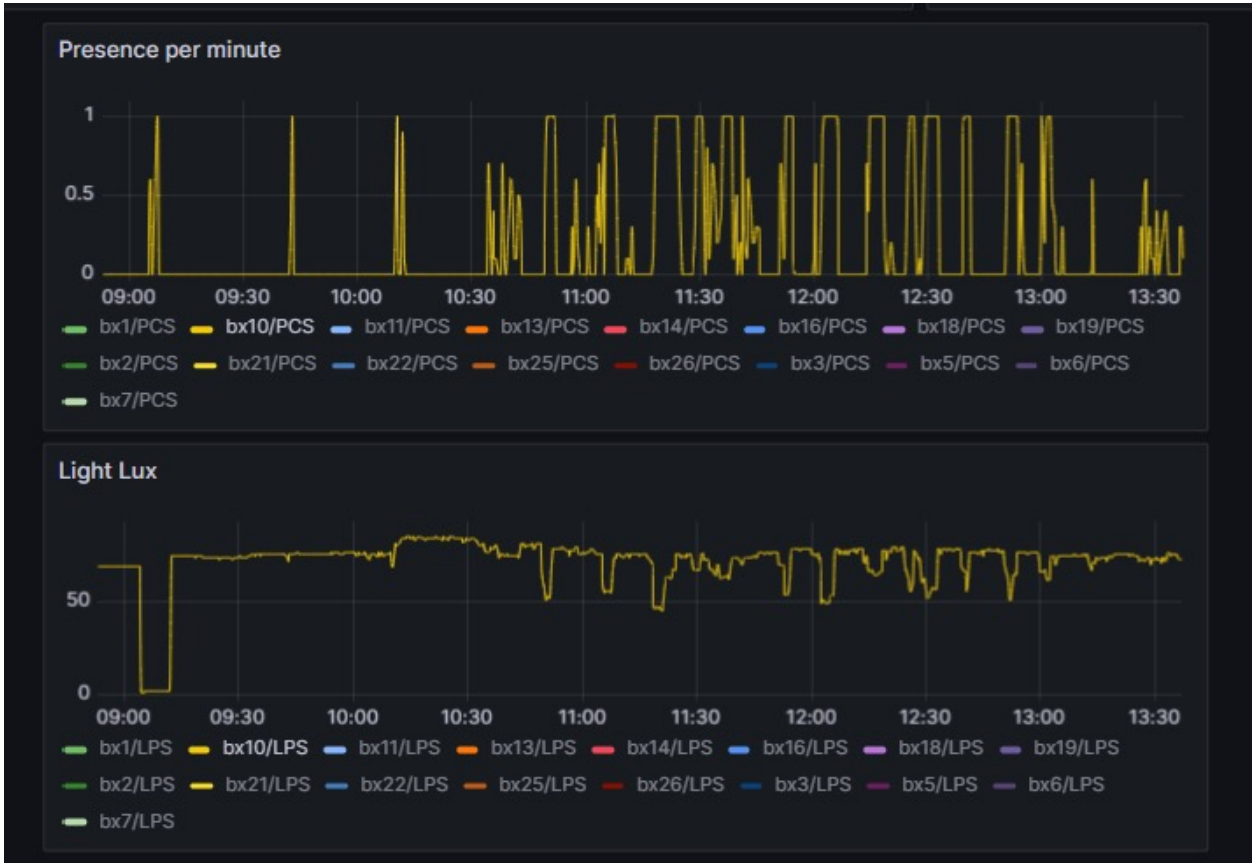


Grafana dashboard

4

Initial results

Cubicles usage in minutes

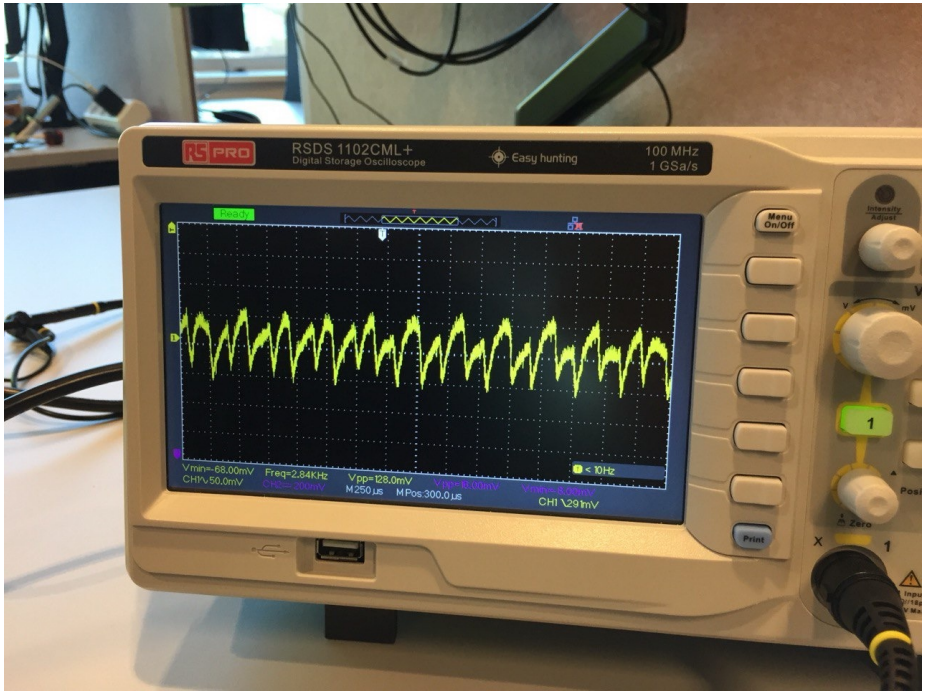


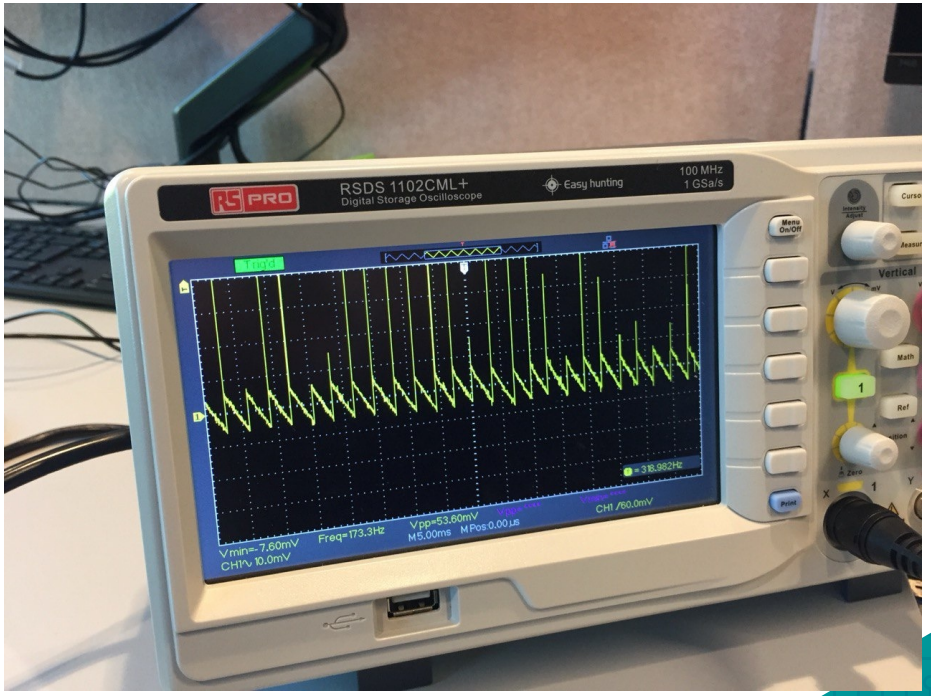
Examination time

Sound average during workday

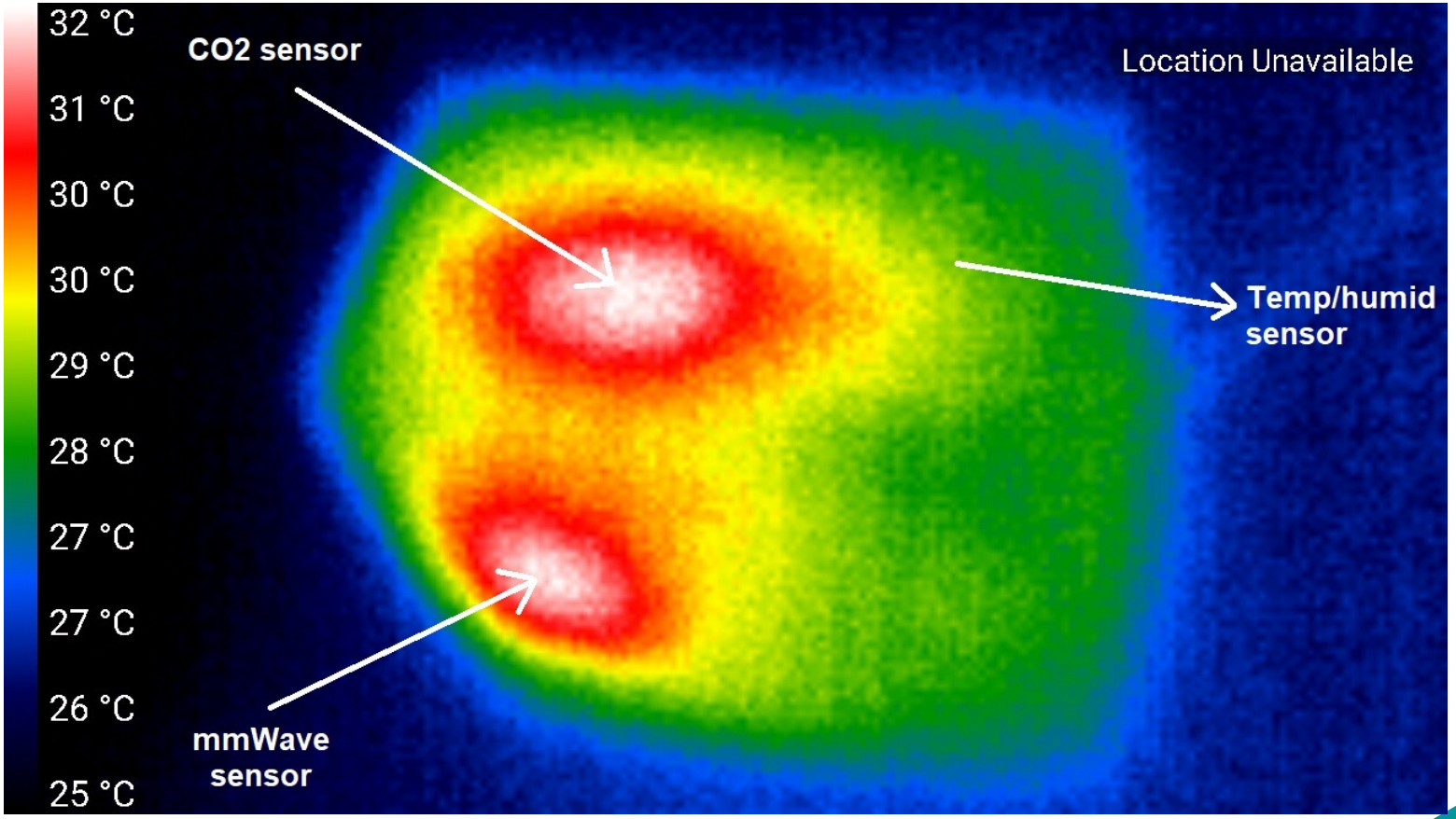
5

Challenges





Sensitivity to power quality



Thermal management

CO2 sensors calibration

Thank you for listening

List of used sensors:

- Gravity: Analog Sound Level Meter (SEN0232)
- DFROBOT: Ambient Light Sensor (0-200klx)
- HDC1080 Humidity and Temperature sensor
- DFROBOT: mmWave Radar (SEN0395)
- Gravity: Analog Infrared CO2 Sensor (0~5000 ppm)