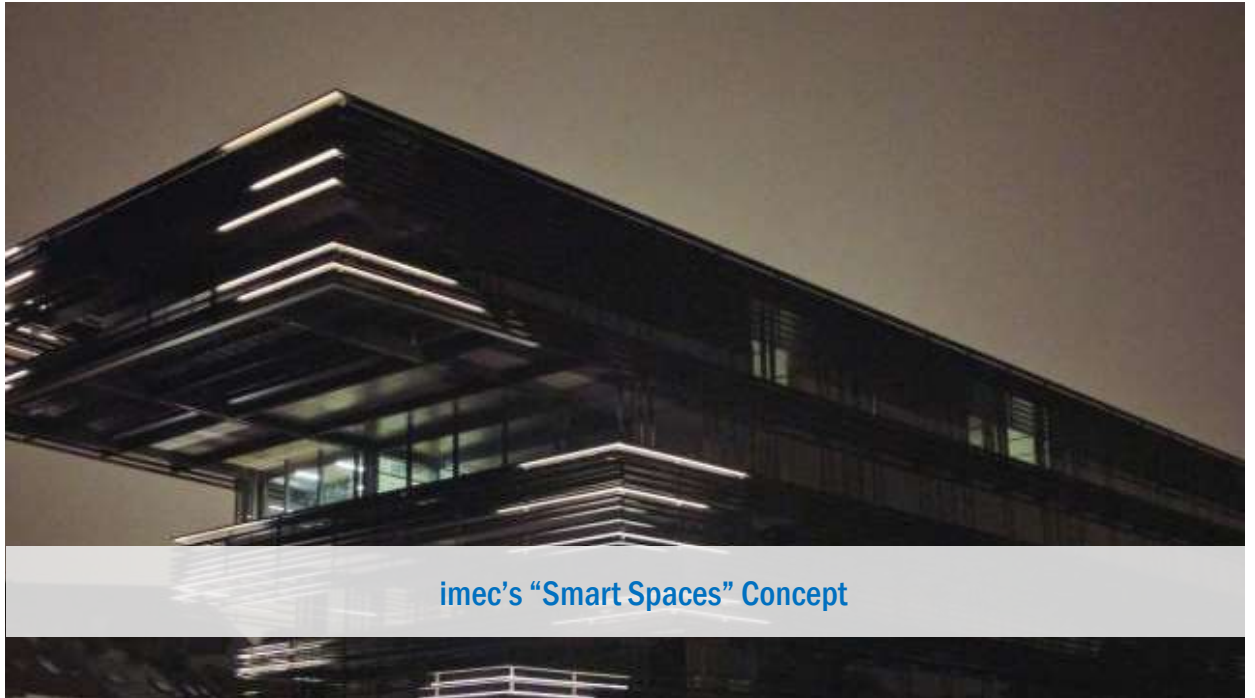




THE INTERDISCIPLINARY CONCEPT

INTERNET & DATA SCIENCE LAB

300

Internet experts and data scientists

IDLab focuses its research on internet technologies and data science. We develop technologies outperforming current solutions for communication subsystems, high-speed and low-power networking, distributed computing and multimedia processing, machine learning, artificial intelligence and web semantics.

+500

Collaborations with innovative industry

IDLab collaborates with many universities and research centres worldwide and jointly develops advanced technologies with industry (R&D centers from international companies, Randers' top innovating large companies and SMEs, as well as numerous ambitious startups).

40+ Professors, 40+ Post Docs

Total income (projects): 15 M€/Y

Fundamental: 3 M€

Strategic: 3,5 M€

EU projects: 4 M€

Local industry: 4,5 M€

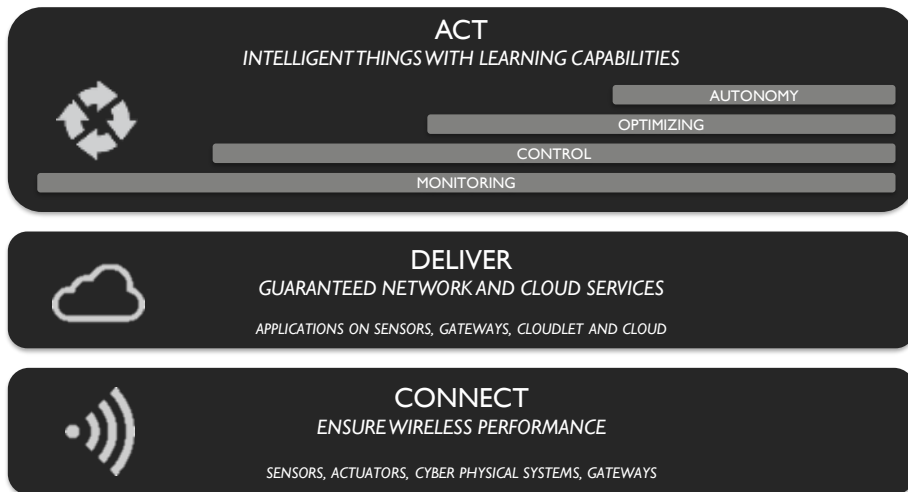
IDLAB
GHENT & ANTWERP



www.idlab.technology
www.idlab.uantwerpen.be
www.idlab.ugent.be



IDLAB - RESEARCH FOCUS – 3 LAYERS



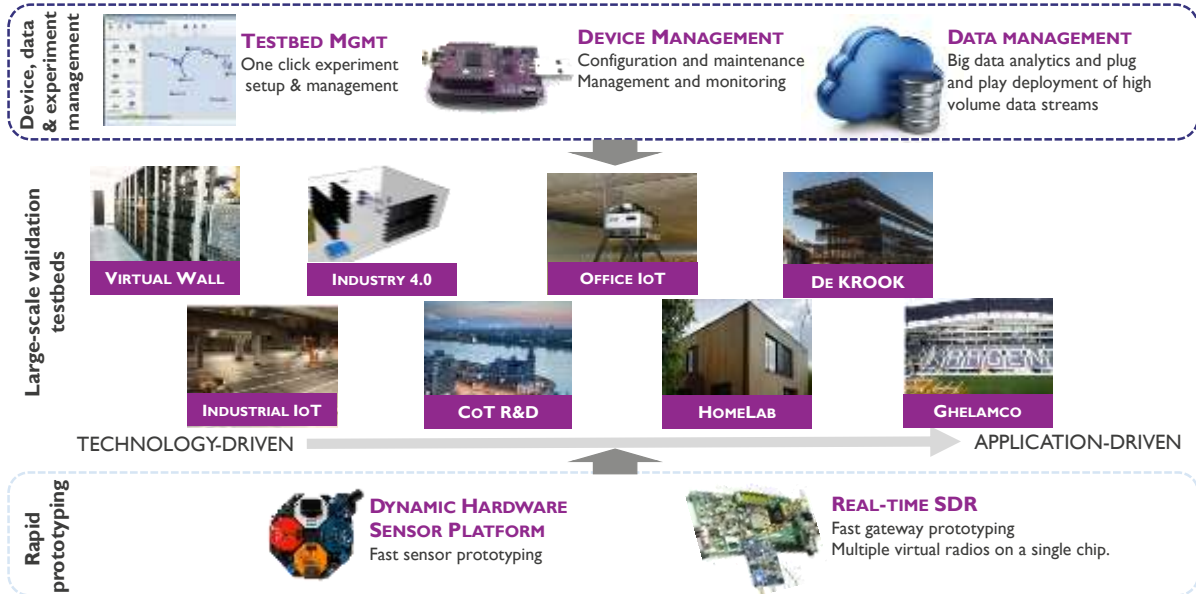
5

LIVING LABS AND TEST FACILITIES

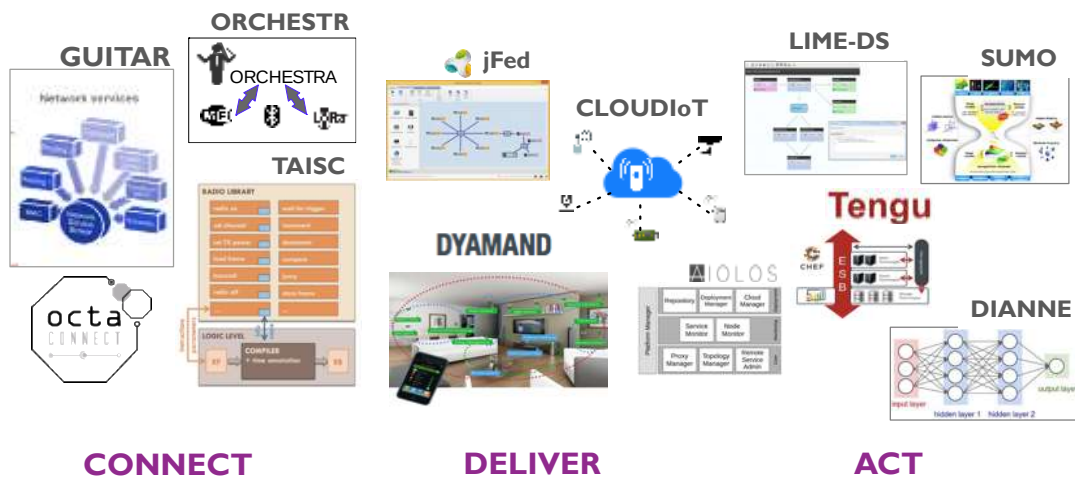


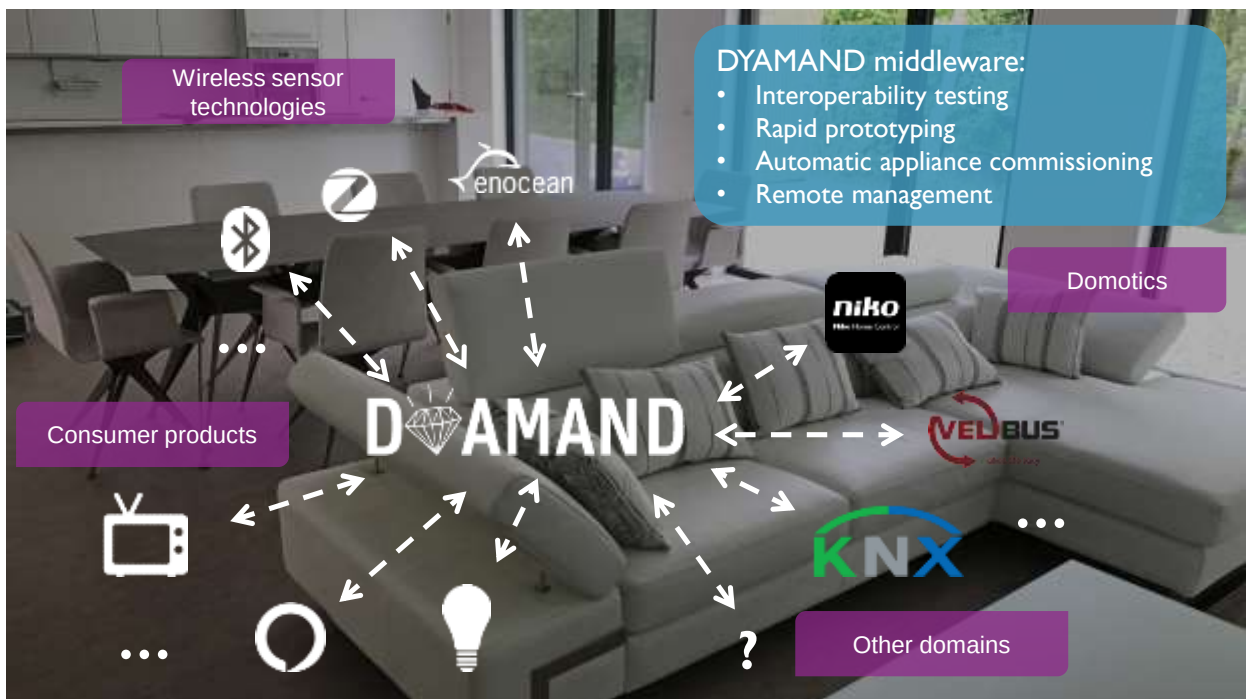
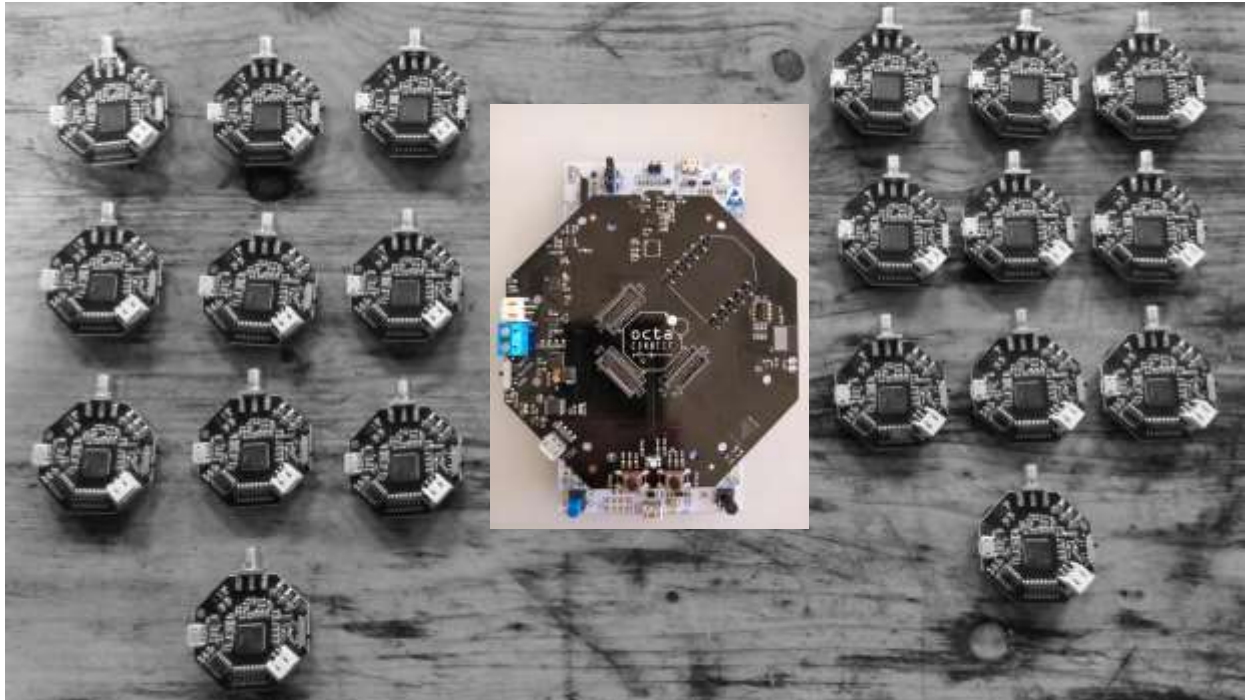
6

RESEARCH INFRASTRUCTURES

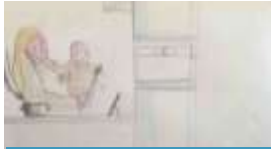


TECHNOLOGY PLATFORMS





INTERDISCIPLINARY APPROACH OF RAPID PROTOTYPING - FUTURE USERS THINK & TEST TOGETHER WITH IMEC & NEWCO



1. PAIN DETECTION



2. PROTOTYPING RESEARCH
LAB



3. CO-CREATION LAB



4. TEST LAB



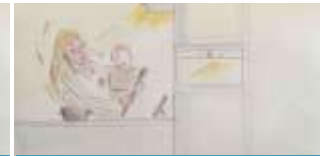
5. DATAWALL



6. USER TEST (LAB)



7. IMPLEMENTATION IN
SMART SPACE



8. IMPLEMENTATION IN
LIVINGLAB

USE CASE I: DEKROOK'S "HOT SEAT"

DE KROOK – SMART PUBLIC LAB

FROM SENSOR TO APPLICATION



- De Krook as a **controlled lab environment** while offering a service to visitors
- **Capturing, modelling, analyzing** and **visualizing** data streams from sensors
- **Co-create, test** and **validate** (smart) technologies & applications in a public environment

13

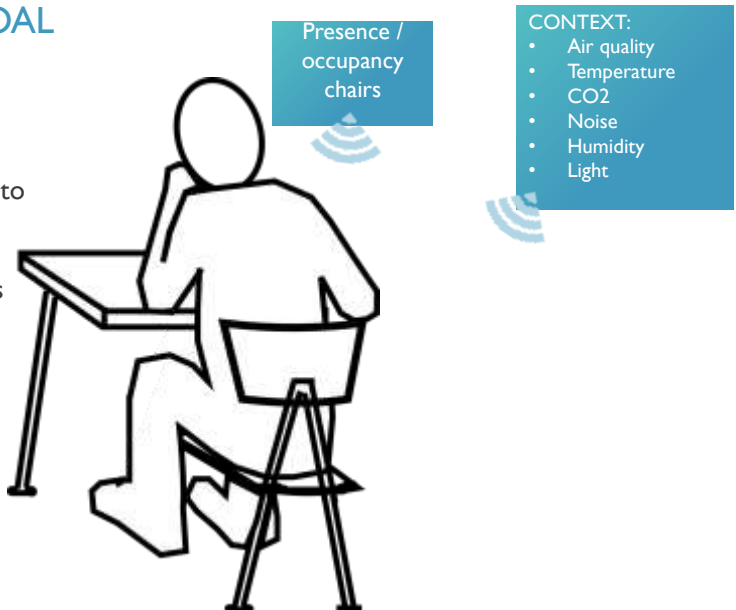
HOTSEAT – SHOWCASE GOAL

Testcase to turn a collection of seating into a **utility** for indoor public spaces

Measuring an occupied chair with various **sensors** and **model behavior**

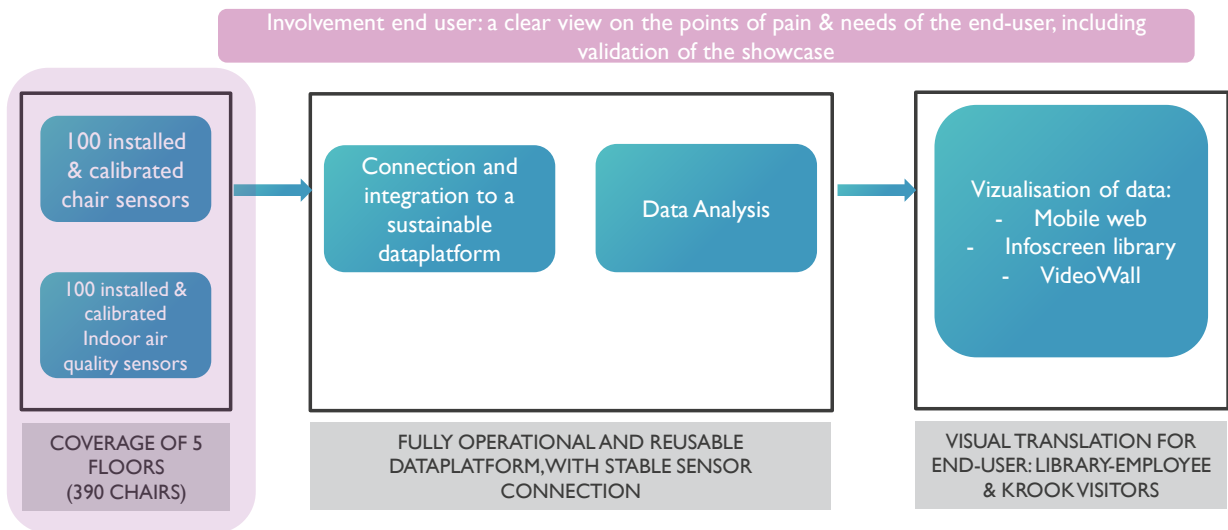
Connect to a useable context: correlations with **air quality data**

Visualization of data in a comprehensible way in MVP



14

HOTSEAT – DELIVERABLES MVP



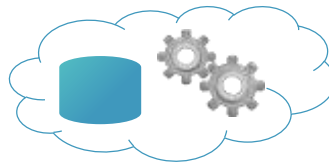
15

HOTSEAT – INFRASTRUCTURE IN THE BUILDING

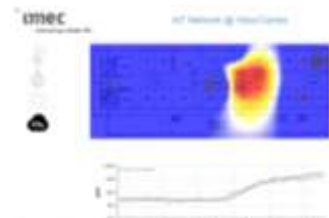
CORRELATING WITH AIR QUALITY, HUMIDITY, TEMPERATURE, ...



SENSOR NODE & NETWORK

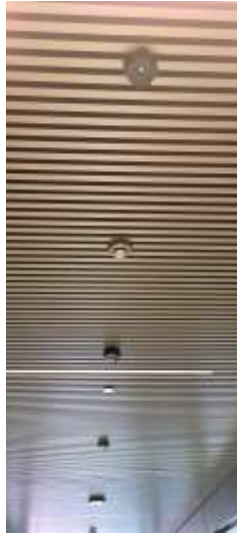


CLOUD PROCESSING,
STORAGE,
AND DATA ANALYSIS



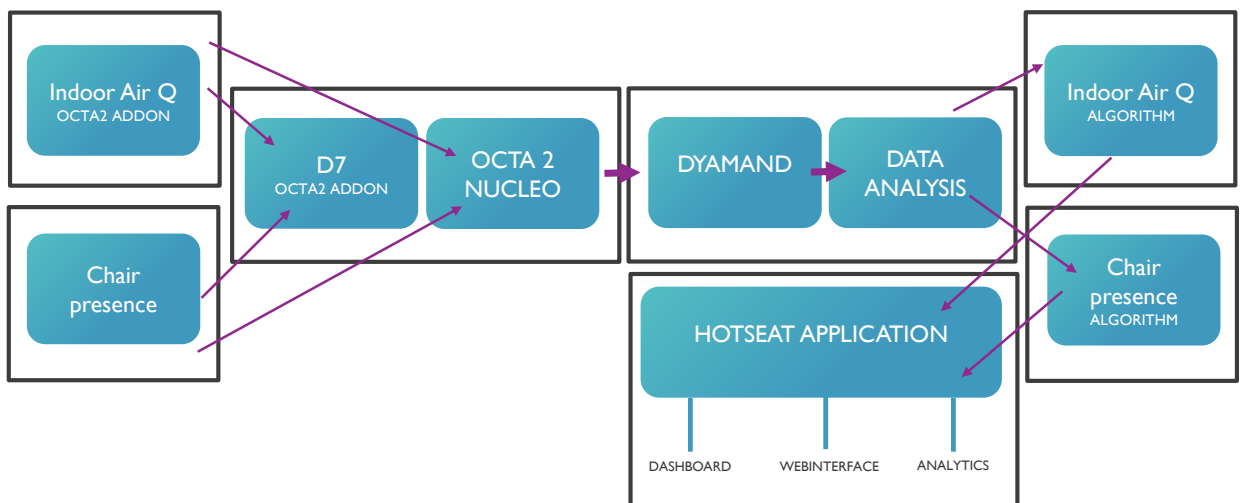
REAL-TIME VISUALIZATION
HEATMAP + PLAYBACK

100 PCS > 5 floors covered



17

HOTSEAT – HW/SW PROJECT STRUCTURE



18

HOTSEAT VIZ

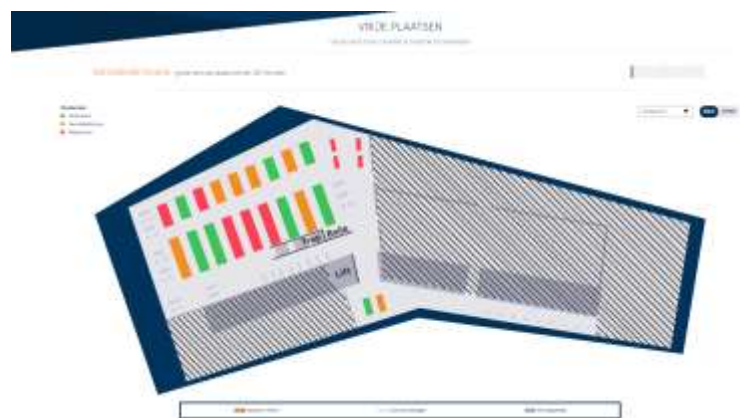
- **REAL TIME INSIGHTS** how busy it is in De Krook (based on study & flex work chairs)



19

HOTSEAT VIZ

- **CHANCE INDICATION** on table level (*availability*)
- **FILTERING** on location of seating and on level of usage
- **NAVIGATION** adaptation of big screen throughout library (*videowall and interactive elevator screens*)



20

USE CASE 2: INDOOR PERSON IDENTIFICATION USING A LOW-POWER RADAR

21

SURVEILLANCE & PERSONALIZATION IN SMART HOME ENVIRONMENTS



Video cameras are widely used

Significant increase in picture quality

Sharp price drop in recent years

Smart algorithms tailored for video

22

SURVEILLANCE & PERSONALIZATION IN SMART HOME ENVIRONMENTS



But are unable to cope with

Low light

Concealing clothing

Sudden light glares

Privacy

"Neither Autopilot nor the driver noticed the white side of the tractor trailer against a brightly lit sky, so the brake was not applied"

23

RADAR AS A SENSOR

“Privacy preserving”

Unaffected by weather and lighting

Unaffected by masking clothes

Through-the-wall sensing capabilities



GAIT-BASED IDENTIFICATION OF PERSONS

Identify people while walking

Using a low-power radar as sensor

Allow spontaneous and free walking

Robust against environment and radar positions

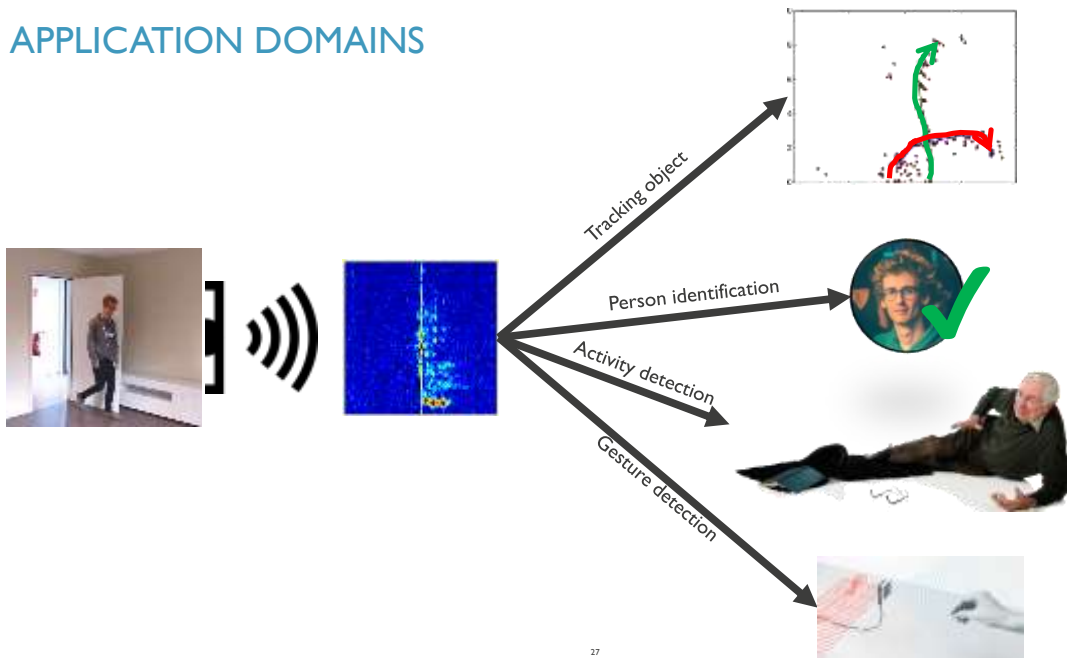


Low-power radar operating at 77GHz

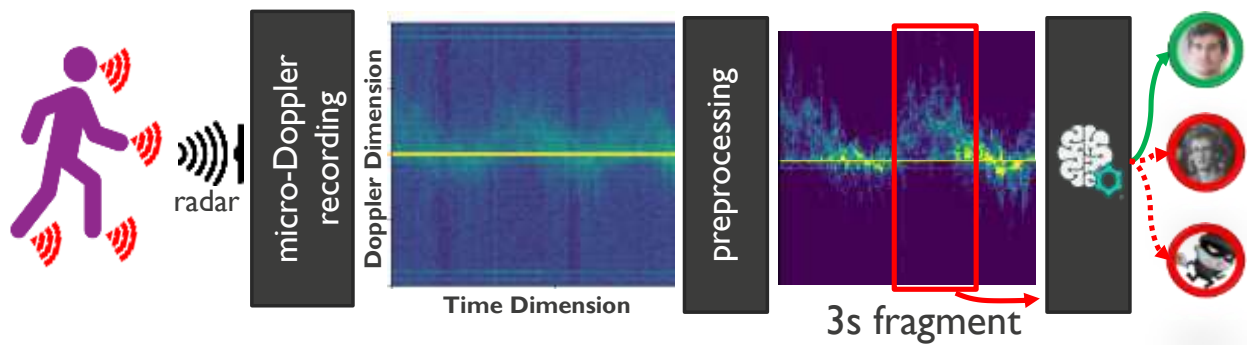
Results in low signal-to-noise ratio

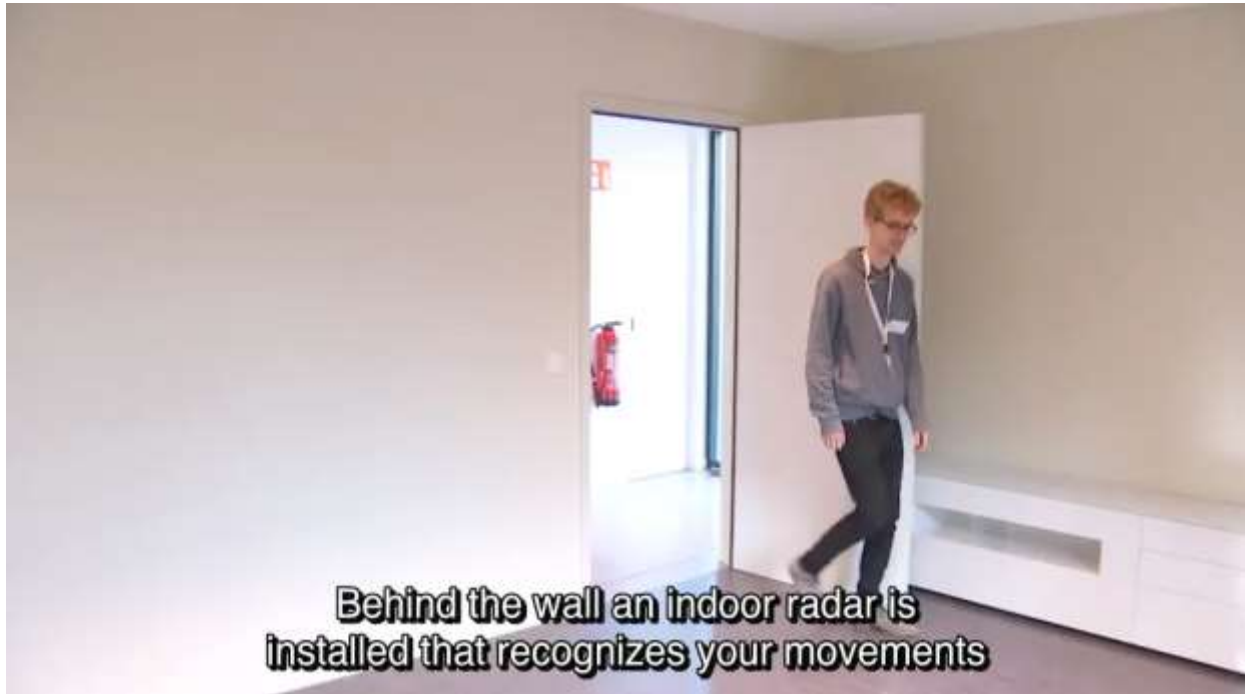
Mainly designed for automotive applications

APPLICATION DOMAINS



INDOOR PERSON IDENTIFICATION USING DEEP NEURAL NETWORKS





RESULTS, CHALLENGES & NEXT STEPS

- Results
 - Person identification (with only 15 minutes of test walking)
 - Intruder detection
 - Multiple person scenario
- Challenges
 - Low power, small size -> noisy signal
 - Single radar -> orthogonal moves not captured well
 - Only gait-based person identification -> people don't always walk in the same manner
- Next steps
 - Sensor fusion -> more information, more accuracy
 - Activity detection
 - Gesture detection



THANKS



31

MORE INFORMATION:

[HTTP://IDLAB.TECHNOLOGY/](http://idlab.technology/)

CONTACT:

ERIK MANNENS – ERIK.MANNENS@UGENT.BE
WOUTER HAERICK – WOUTER.HAERICK@UGENT.BE
MATTHIAS STROBBE – MATTHIAS.STROBBE@UGENT.BE
ANN ACKAERT – ANN.ACKAERT@UGENT.BE

32