# PANEL: Advances in Computer-Human Interactions

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INSTITUTE FOR APPLIED COMPUTER SCIENCE

The Tenth International Conference on
Advances in Computer-Human Interactions
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# Panelist

- Lasse Berntzen, University College of Southeast, Norway
    - Human-centric System Design and Industrial Manufacturing
- Mahmoud Kamel Mahmoud Abdelaziz, Fayoum University, Egypt
    - Future Textile Technologies to Change Fashion
- Sandrine Bernardini Aix–Marseille University, France
    - Environmental gas microsensors : application and opportunities (Advantage to microsensors/ Innovation/ The market segmentation)
- Liane Koker, Karlsruhe Institute of Technology, Germany
    - System integration of smart flexible multilayer printed systems, that can be applied to walls, machines or curved surfaces like human skin.

# Smart Textile

- Watches, smart clothes for medical application…



Source: ID107
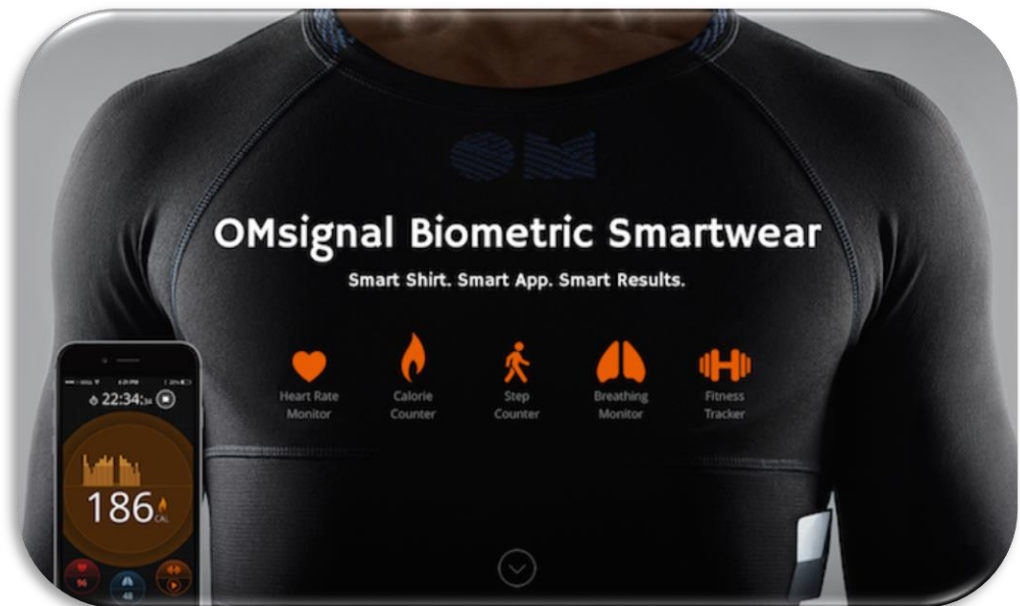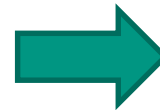


Source: OMsignal

# Computer – Human Interface

- Mouse -> Tablet -> google glass->…

Source: IBM

Source: Apple

Source: Google glass

Source: ASUS

# Discussion

- What do you foresee for Advances in Computer-Human Interactions?

- When will I be able to buy clothes tracking my physiological parameters?

- Which kind of sensors will enable those clothes?

# Future Textile Technologies to Change Fashion



**Eng. Mahmoud Kamel Mahmoud Abdelaziz**

# TEXTILE DESIGN

Textile designing is a creative field that is important for a wide range of scientific and industrial processes. Textile designing is a major area of interest within the field of fashion design, carpet manufacturing and any other cloth-related field.
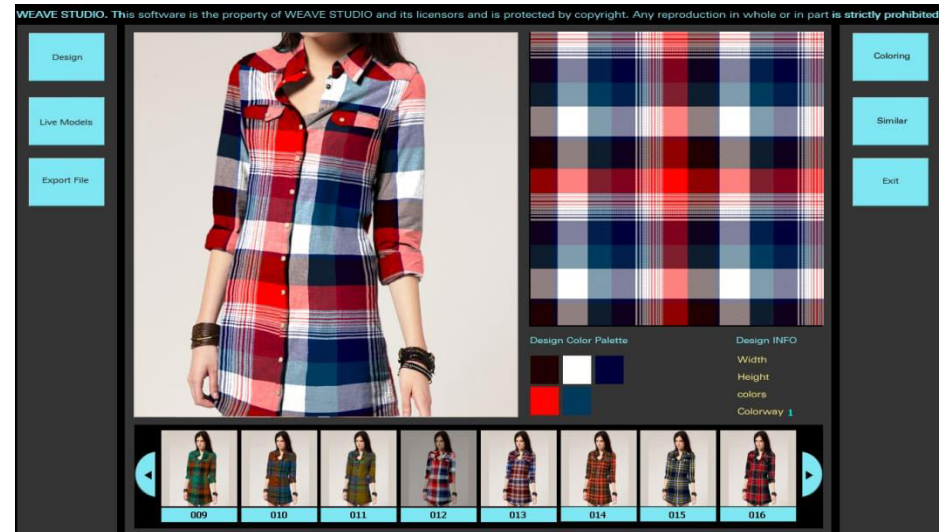


WeaveStudio live models

# WeaveStudio : **TEXTILE DESIGN**

With the growth in fashion-tech considered so relevant right now that **WeaveStudio** dedicated an entire week-long program to it, we've gathered up five scientific breakthroughs that are far less the stuff of science fiction than you might think.

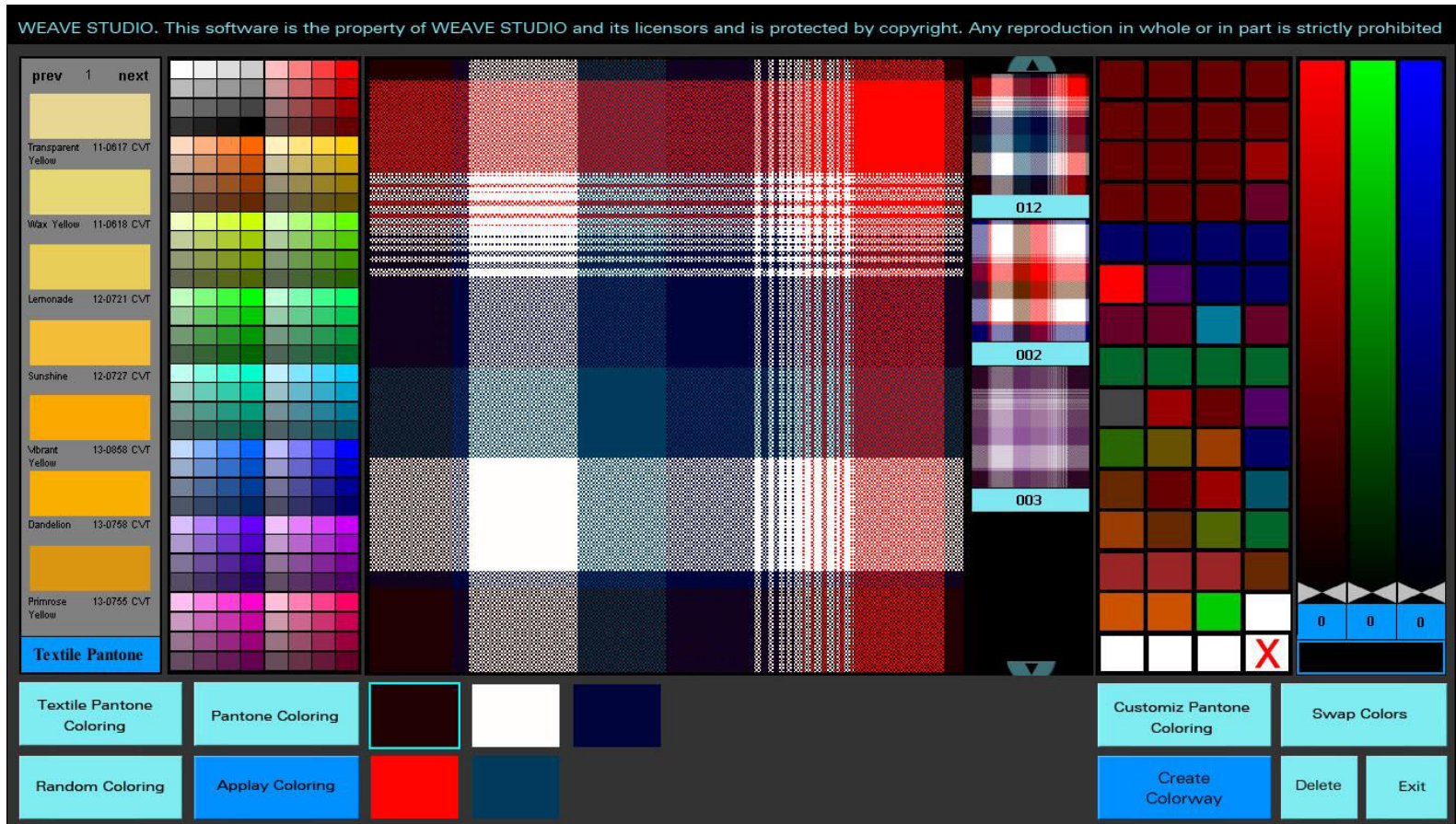| Textile Pantone Coloring | Pantone Coloring | Customiz Pantone Coloring |
|---|---|---|
| Random Coloring | Applay Coloring | Create Colorway |

# WeaveStudio: Work Flow

WeaveStudio uses a common color palette to relate every aspect of style specification including graphics and textual information as shown in Figure 2. Some of the most common repeats are straight and half drop. Often, the same design is produced in many different colored versions, which are called live models.
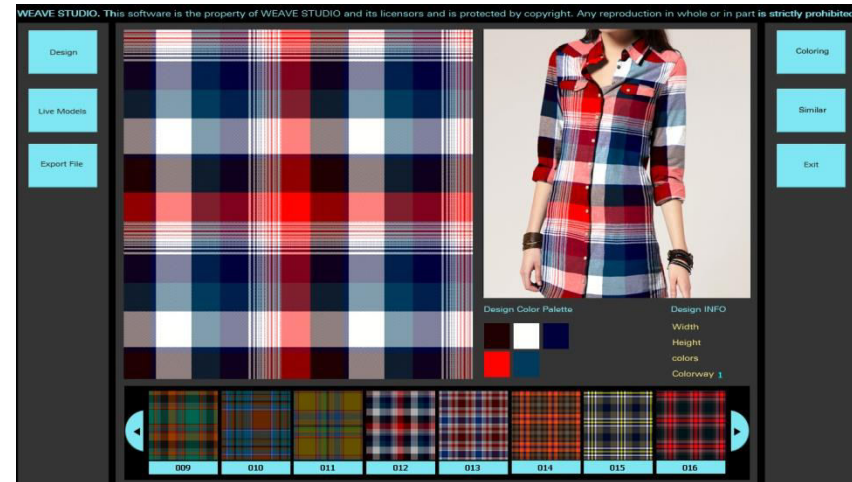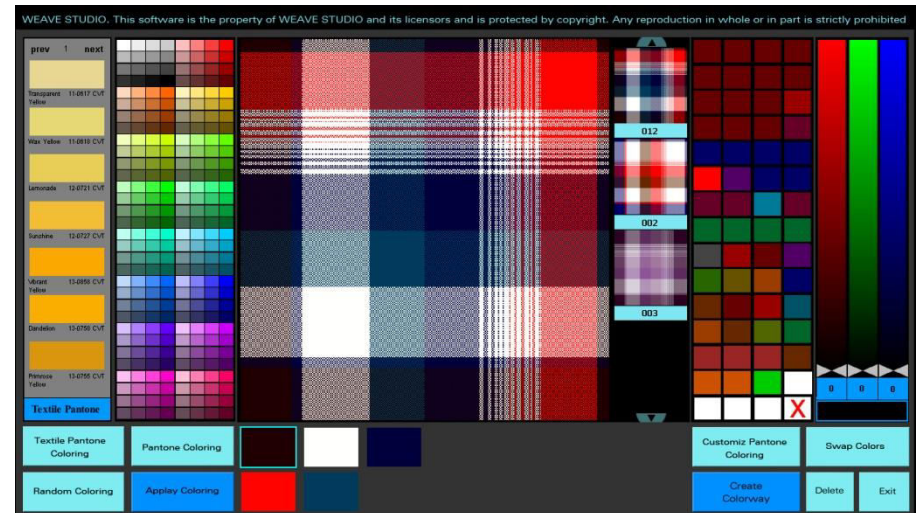


WeaveStudio Workflow

# WeaveStudio: Customize pantone coloring

# WeaveStudio: Customize pantone coloring

Customize pantone coloring is the other method to make your textile unique. In WeaveStudio Customize pantone coloring as an expression of textile design power provide designers with a usable tool of color in constructing identity, the creation of color via contemporary technical advances
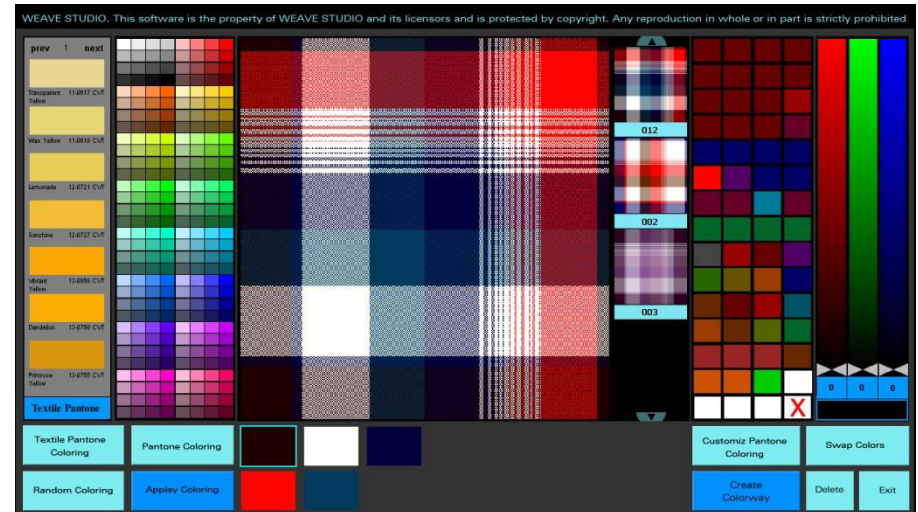
# WeaveStudio: Customize pantone coloring

Customize pantone coloring is the other method to make your textile unique. In WeaveStudio Customize pantone coloring as an expression of textile design power provide designers with a usable tool of color in constructing identity, the creation of color via contemporary technical advances

# WeaveStudio: Summary

- Modifying designs with advanced color management

- Using a variety of color modes.

- Including knits and weaves, as you create a choice of textiles and colorways.

- Printing digital textile design.

- Creating multiple colorways and palettes.

- Designing, creating and manipulating the textile prototypes.

- Repeats, drops, engraving sizes

- Work with different file formats.

- Allows the view of one repeat, many repeats, and real image size.

- Efficiently and quickly design custom fabrics and results appear immediately.

- Export multiple designs at once.

- Its user friendly workflow enables to make the textile design faster and error free

**WeaveStudio Founder**
**Eng. Mahmoud Kamel Mahmoud Abdelaziz**
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**Panel (ACHI, Nice, France)**
**Human-centric System Design and Industrial Manufacturing**
**Lasse Berntzen**

# What is Human-Centric?

- Is it any difference between user-centric, citizen-centric and human-centric?
- All is about focusing on humans and solving problems in a way they feel comfortable with. Efficient, Affordable, User-Friendly.
- But human-centric may be even more focused on the limitations of the human body: Accessibility, Ergonomics, Cognition.
- Most important: Involving users in all stages of product/service/process development

# Norwegian Flirt trains



- 2012: 23 new train sets were put into service

- Massive complaints from users about the seats

- Seats were changed for a price of 5 million Euro (finished in 2014)

# Collecting urine samples

- One year pre-project to find a more human way of collecting urine samples from drug-addicts enrolled in drug-assisted rehabilitation program.

- Today samples are collected under supervision (to make sure the patients are not using other drugs)

- The urine collection is a problem for many patients, and some are not even able to deliver their samples

University College
of Southeast Norway

# Collecting urine samples

- The project aimed to find a way to circumvent the collection under supervision

- Extracts DNA from urine sample to make sure it is from the right person.

- Also checks if sample is not manipulated (The sample needs to be fresh)

University College of Southeast Norway

# Human-Centric System Design

- Worked with patients to understand their concerns
- The patients have to meet at a medical center to deliver their sample
- This often involves both planning, stress and a lot of time
- If they could do the sample at home and then deliver, the process would be much better

# Human-Centric System Design

- DNA is problematic, since the users are somewhat paranoid about the possible use of DNA

- Evidence in criminal cases requires 17 markers, we use only 5 markers

- Our DNA-profile can not be used as evidence or to connect patients to crimes
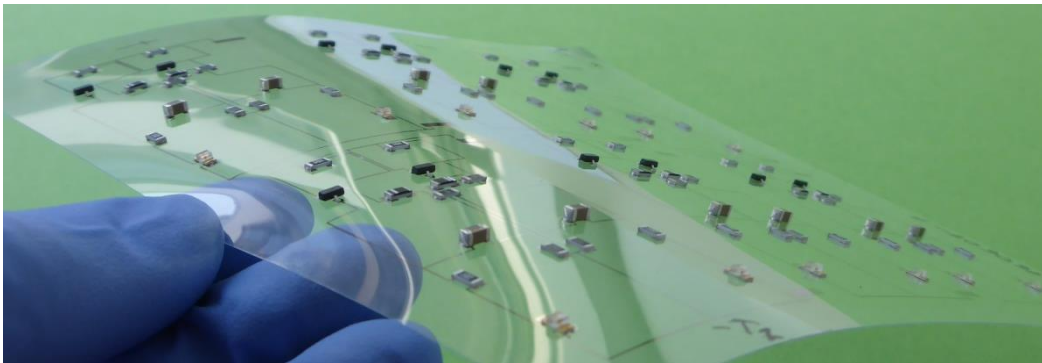
# Human-Centric System Design

- Systematic collection of user input
- Collaboration, participation
- Users may be co-creators of the service
- Adding their wishes and expectations
- But also their competence
- Mindset

# System integration of smart flexible mulitlayer printed systems

Liane Koker

Institute for Applied Computer Science
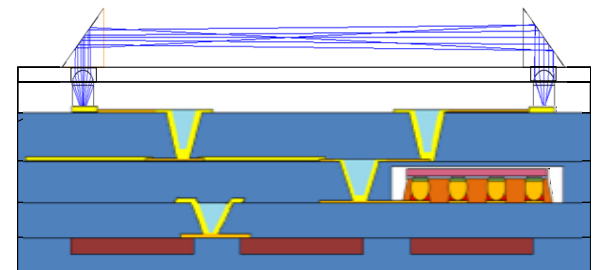
# Printing technologies

- Advantages
    - Resource-saving additive manufacturing
    - Large area inexpensive systems realizable
    - Very flat geometry
    - High bending properties and flexibility
    - Potentielly high integration density
    - Computer-to-print-production possible
      → small setting effort, high potential for automation
    - Generative production technology of tailor-made customized systems, allowing for small production quantities down to a single piece
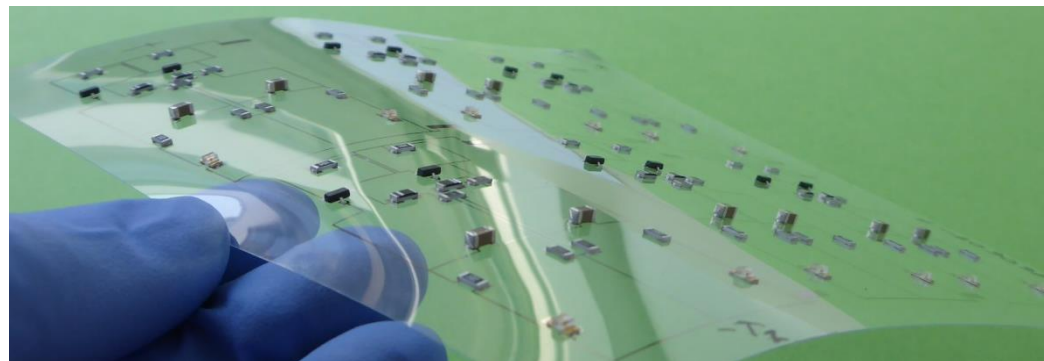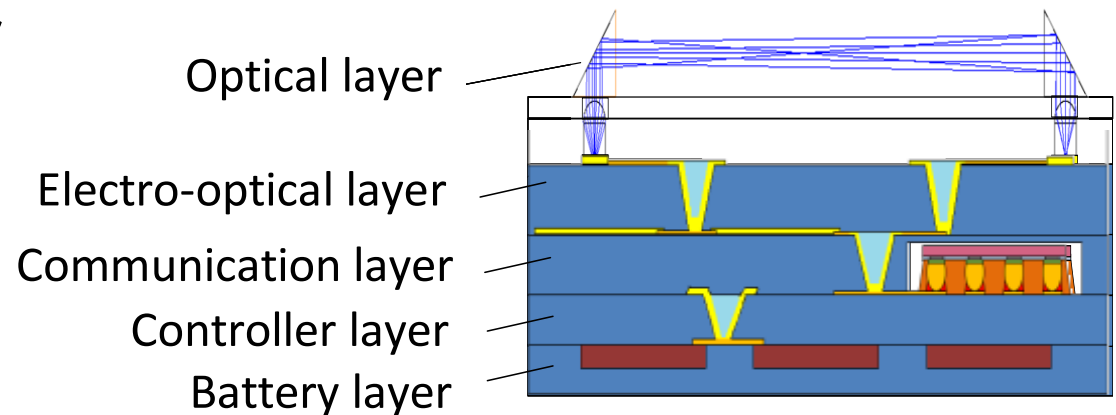
# Multilayer printed systems

- VISION: Printing flexible, smart, highly integrated  multilayer systems
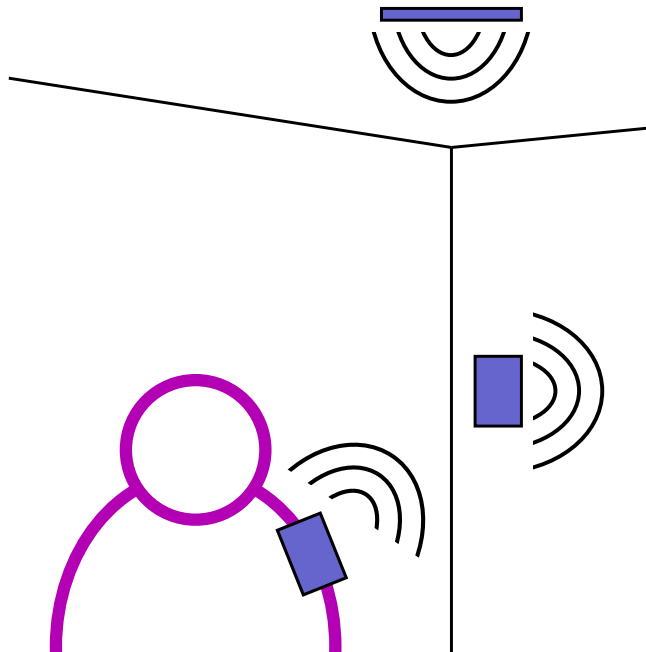
- Functionalized layers for
  - Electronics
  - Sensors
  - Battery
  - Optics
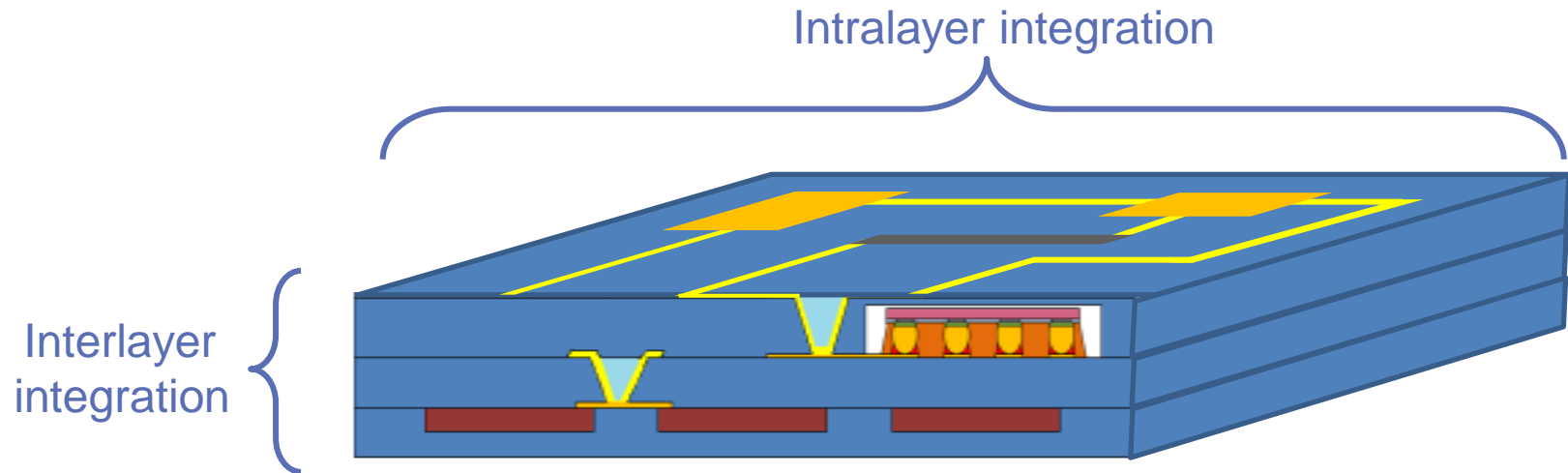  - Fluidics

Optical layer

Electro-optical layer

Communication layer

Controller layer

Battery layer

# Potential applications

- Human-centered alarm systems



- Condition monitoring of workpieces, machines and goods for industry 4.0
- …

# System integration



Intralayer integration

Interlayer integration

- Issues to be adressed
  - Reliability and yield of printed elements
  - Embedding and contacting of silicon and SMD components
  - Bonding and electrical interconnection of individual layers
  - Matching of all manufacturing processes
  - Testing of functionality, flexibility and reliability of printed systems
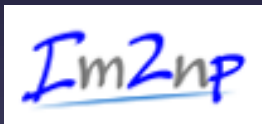
# What is the role of human participation

- **Humans as targets of sensing :**
  Health monitoring

- **Humans as sensor operators :**
  Cameras to collect and share raw measurement data and media streams
  Vehicles may also embed sensors collecting measurement

- **Humans as data sources :**
  acquiring and disseminating information on their own, without the aid of sensing device
  HUMan INTelligence as opposed to electronic sensors

# Sensing and communication capabilities



Safety

Alimentation

Security

Environment

Proliferation of devices

House monitoring

Health

Clothes

Transport : People, food, …

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# What do we really needs ?
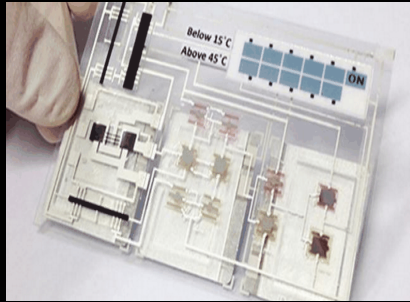


Source : Thinfilm

Daily life

Many industrial applications

Lightweight, Portable, integration on chip

Rogers research group
at the University of Illinois

Low cost production

Skin hydration and temperature,
signals from muscle and brain activity

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# Advantages of gas MicroSensors

## Traditional environmental monitoring methods:

- Are expensive (>$15,000 per unit)
- Require trained personnel to interpret data
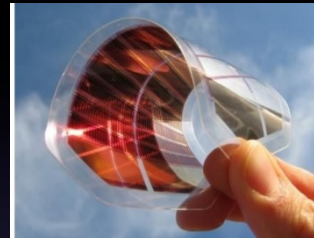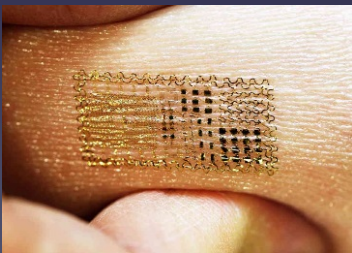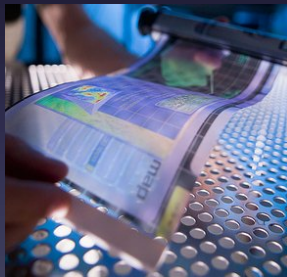- Have low spatial coverage
- Require regular maintenance
- Poorly positioned: on top of buildings / away from people
- Analyze a very limited sample of air

## Micro - sensors are:

- ✓ Small ( < 10 mm$^3$)
- ✓ Low cost (< $10 per unit)
- ✓ Low power ( < 30 mW)
- ✓ Easily integrated into a wide range of products

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# Sensors in Phones and Environmental gas microsensors

Plug in monitor for environmental and breath analysis are widely available < $50



Source: IDTechEx

Many sensor manufactures target mobile phones as a key market ( Bosch, FIS, ams, sensirion…)

First phone launched Q2 2016 K free F5002 smartphone: detect VOC

Smartphone cases increasingly containing environmental sensors

# Market Segmentation

## Environmental gas microsensors

| | |
|---|---|
| **Mobile** | Mobile phones, tablets<br>Phone cases, |
| **Wearable** | Smart watch, tee shirt<br>Badges, clip on sensors |
| **Smart Home** | Air quality monitors,<br>connected devices, air Purifiers |
| **Automotive** | HV/AC systems in cars |
| **Smart City** | Sensors network, transport nodes |
| **Food** | Sensors for Food Safety and Quality |

# Environmental gas microsensors

Air pollution = more than 4.7 millions of death

CES Innovation Award Honoress 2017

**Embedded Technologies**
ZMOD3250: Multi-gas Sensor Array
**IDT**
Sourc

Atmotube – "Tech For A Better World" Category

Figure 4. Atmotube is a portable air pollution monitor that detects a wide range of volatile organic compounds (VOCs) and harmful gases (e.g. Carbon Monoxide).

**Home Appliances**
LG Air Purifier PuriCare 360
**LG** Life's Good

Air quality breath detection

Portable air pollution monitor that detects a wide range of volatile organic compounds (VOCs) and harmful gasses like Carbon Monoxide (CO)

Great circulation and air flow to help purify large rooms faster than ever before

# Questions

What do we need to measure ?

How can we perform it ?

Do we really need these measurements ?

## Thank you !

Im2np

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