

Smart Wearable Devices

Presented by

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Nine Tiles

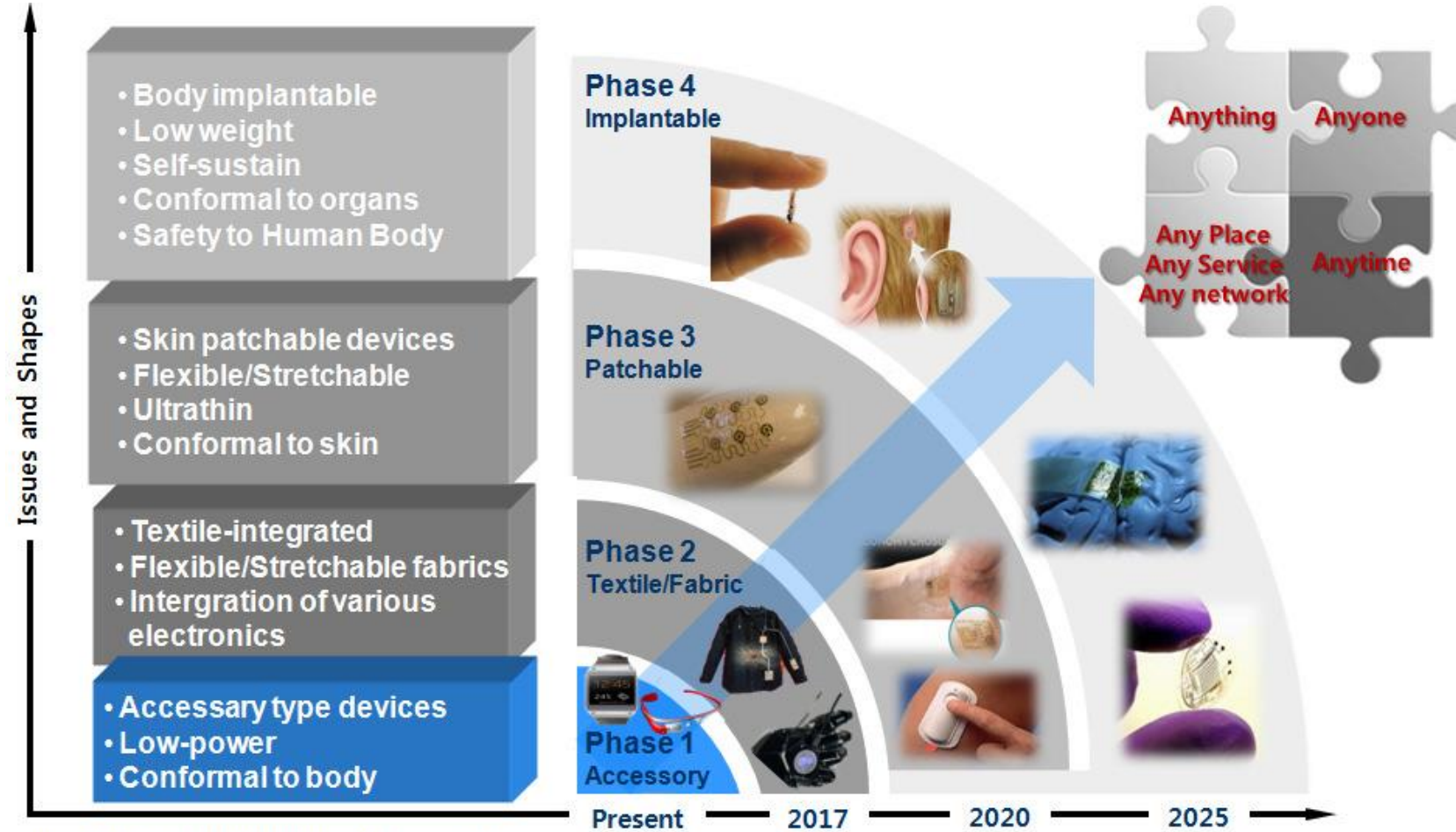
What are Smart Wearable Devices?

- The IoT has the potential to connect billions and billions of “things” to the Internet by 2020, ranging from bracelets to cars
- Breakthroughs in the cost of sensors, processing power and bandwidth to connect devices are enabling ubiquitous connections already.
- In 2014 Goldman Sachs highlighted five key verticals of adoption: Connected Wearable Devices, Connected Cars, Connected Homes, Connected Cities, and the Industrial Internet.
- Early simple wearable products like fitness trackers and activity monitors are already gaining traction. More than 300 such devices were on the market at the end of 2015, 40% are fitness trackers, 40% lifestyle/computing, 10% healthcare adoption.
- New Smart Wearable Devices being launched everyday.

Conventional devices and Wearable Smart devices



Technology roadmap



source : Ministry of Trade, Industry & Energy of Korea

Definitions in IEC SG10

(SMB Strategic Group on Smart Wearable Devices)

- **Wearable Smart Devices:**

- electronic devices and components intended to be located near, on or in an organism that have intelligent functionality and/or may be a part of an intelligent system via connectivity

- **Near-body electronics**

- electronic devices and components intended to be located near an organism where it does not contact the external surface of the organism directly

- **On-body electronics**

- electronic devices and components intended to be located on an organism where it contacts the external surface of the organism directly

- **In-body electronics**

- electronic devices and components intended to be located internal to an organism

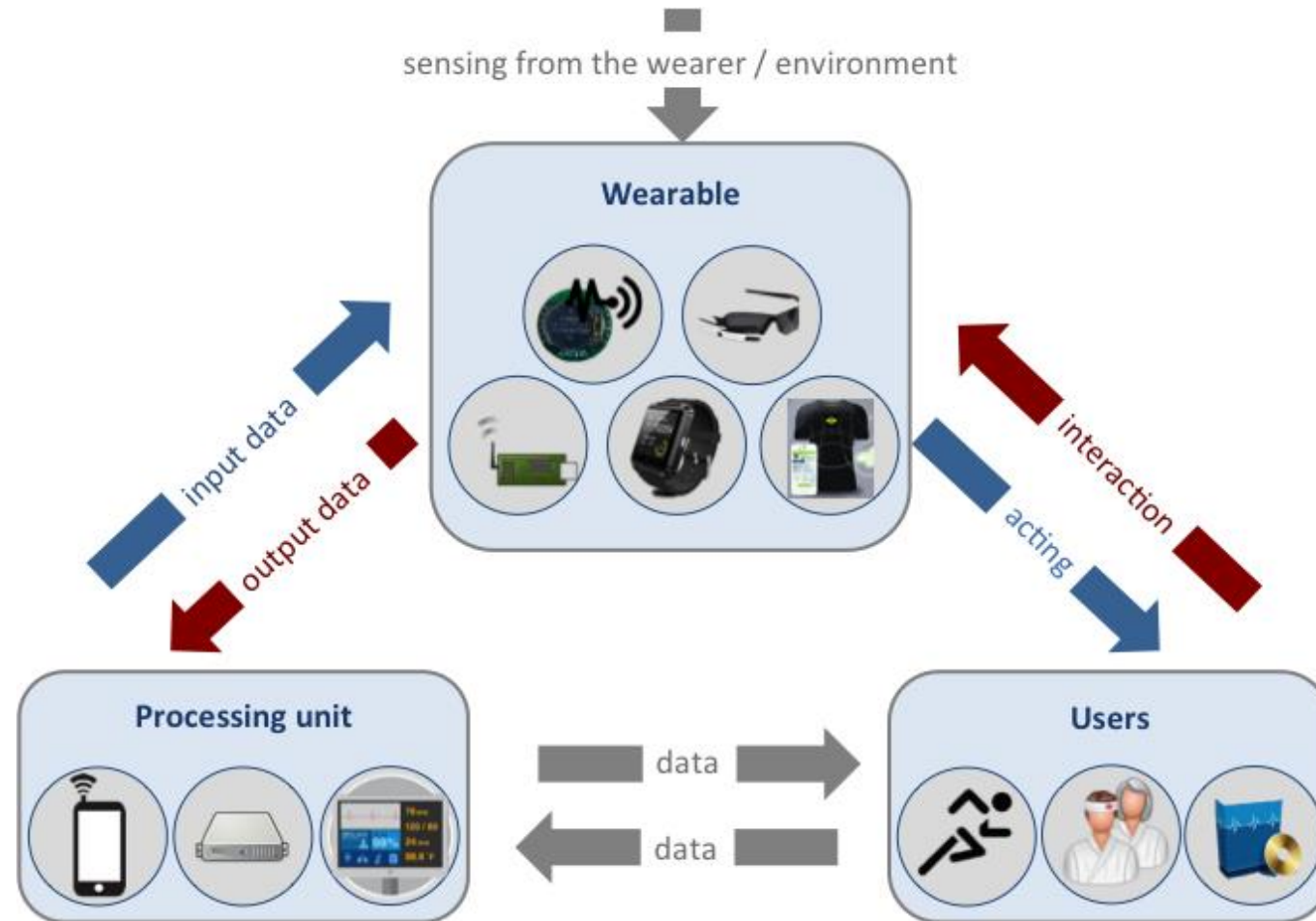
- **Electronic Textiles**

- fabrics or textile-based electronic devices and components

Terminology in Exploration on MloTW in on ISO/IEC JTC 1 SC29 WG11 MPEG Wearables

- **Wearer:** any living organism that is sensed by a Wearable.
- **Wearable:** any thing that senses the Wearer; it may have control, communication, storage and actuation capabilities, and sense the Wearer environment.
- **Mwearable:** a Wearable having at least one of media communication or storage capabilities.
- **User:** any living organism, physical object or software interacting with and / or acted by a Wearable; it may also interact with the Processing unit through devices and interfaces out of the scope of MPEG Wearable. In some applications, the Wearer is also the User.
- **Processing Unit:** a unit or a set of units, some of which can reside in a local client and/or in a remote server that intelligently processes the information received from and provides the results to the Wearable and/or the Wearer

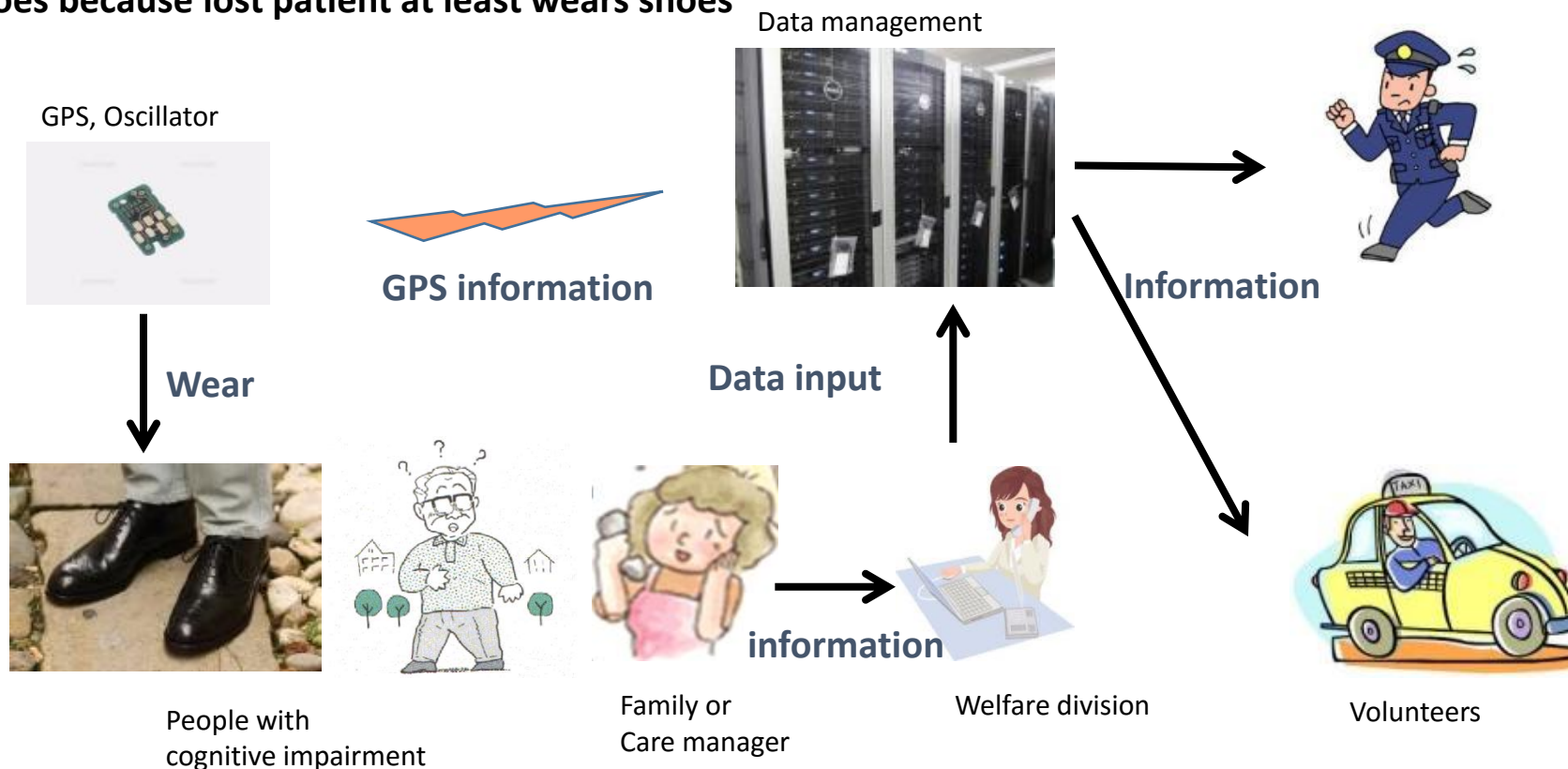
Conceptual Model for Wearable MPEG



On-body electronics: A searching system for people with cognitive impairment

Aim: To find patients in early stage with secure data management system

- 1. Secure personal information system**
- 2. Registration of patient and quick information delivery of lost patient**
- 3. GPS and oscillator worn by patient**
 - GPS in shoes because lost patient at least wears shoes



On-body electronics: Wearable Position and Sensing Example Healthcare Device: Silmee™ Bar type - Sleep state analysis application



TOSHIBA

貼付け型ウェアラブル生体センサ「Silmee™ Bar type」



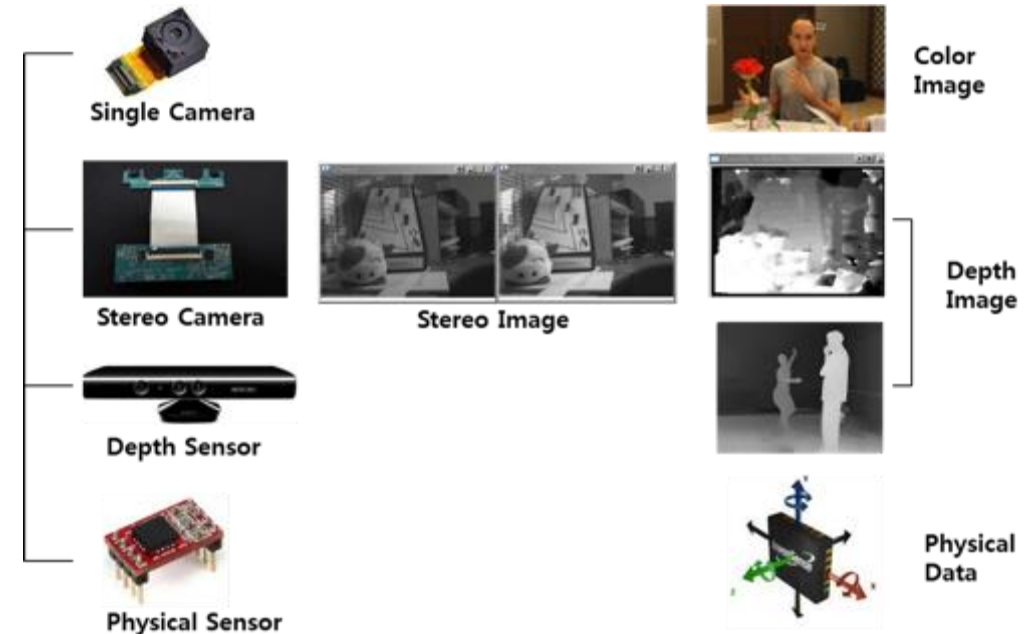
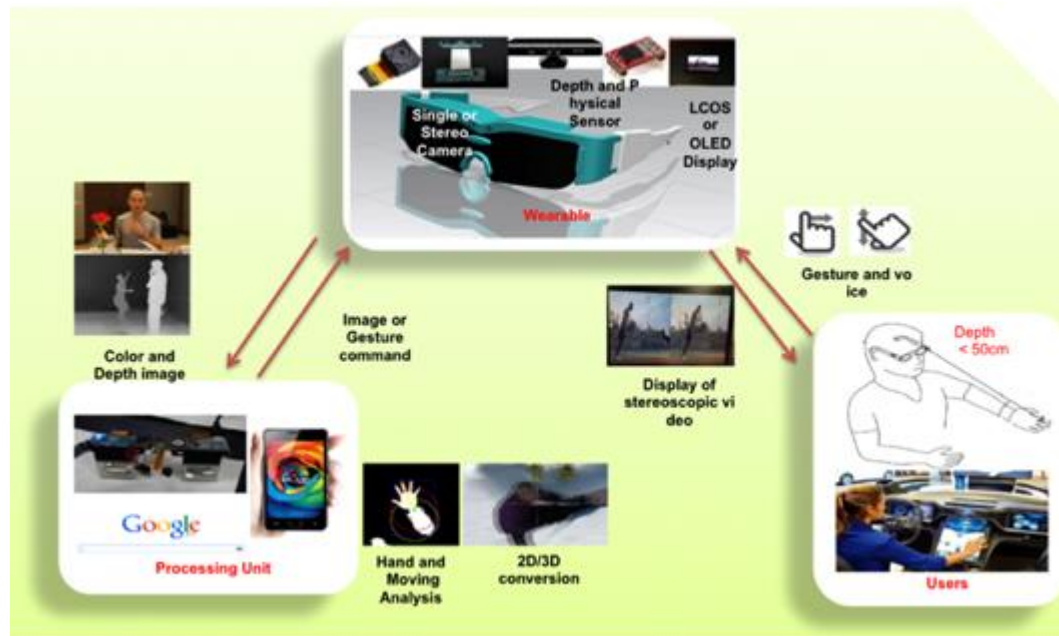
ECG (Electrocardiogram)
electrodes

Pulse wave sensor,
temperature sensor and
3 dimensional accelerator
inside package

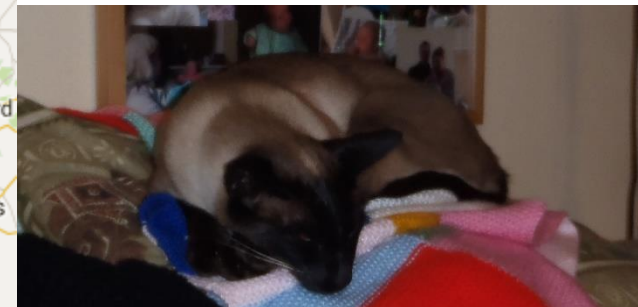
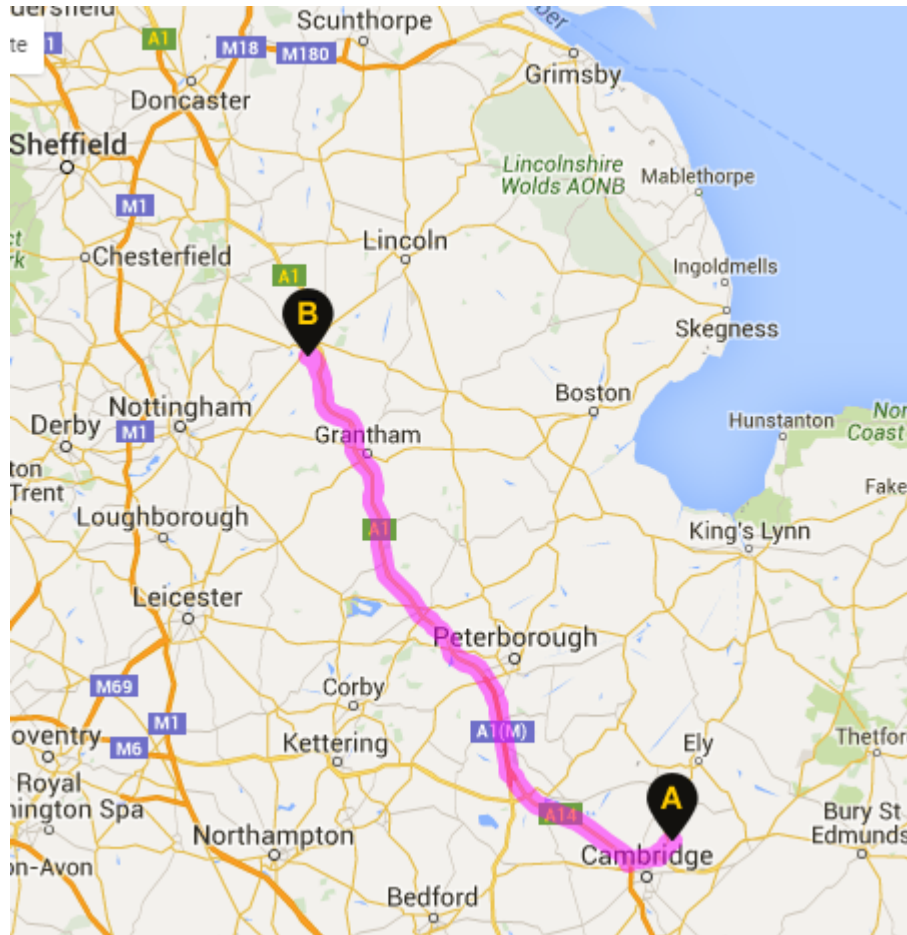
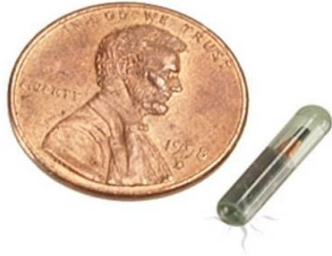
Bluetooth connection to
tablet display



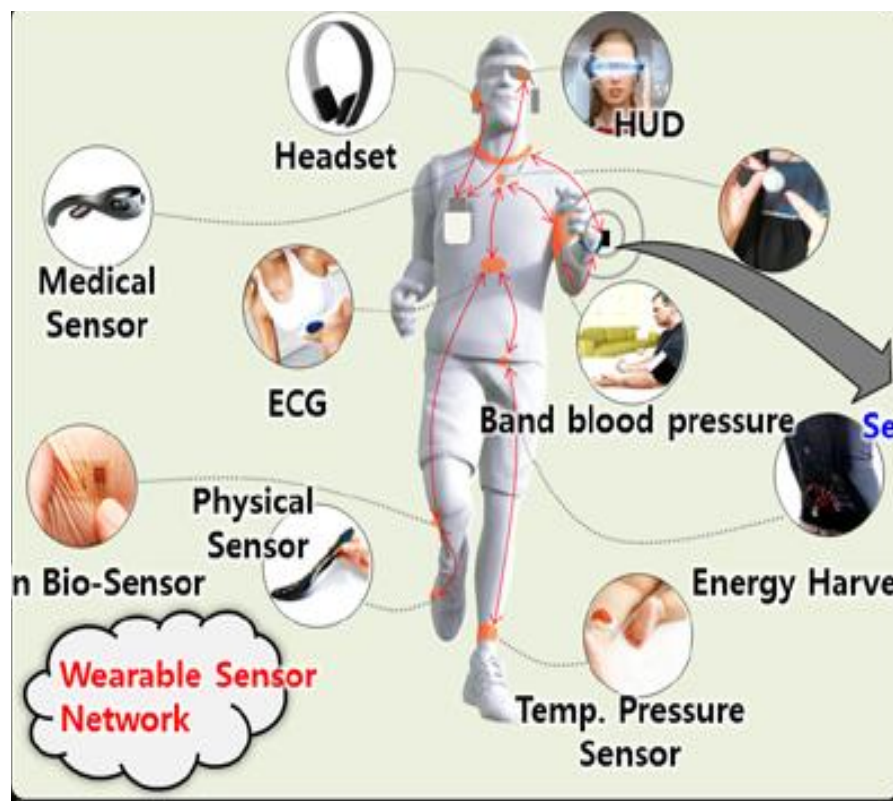
On-body electronics: Smart Glasses and their input devices



In-body electronics: Return of missing cat – the one and only Leo Grant

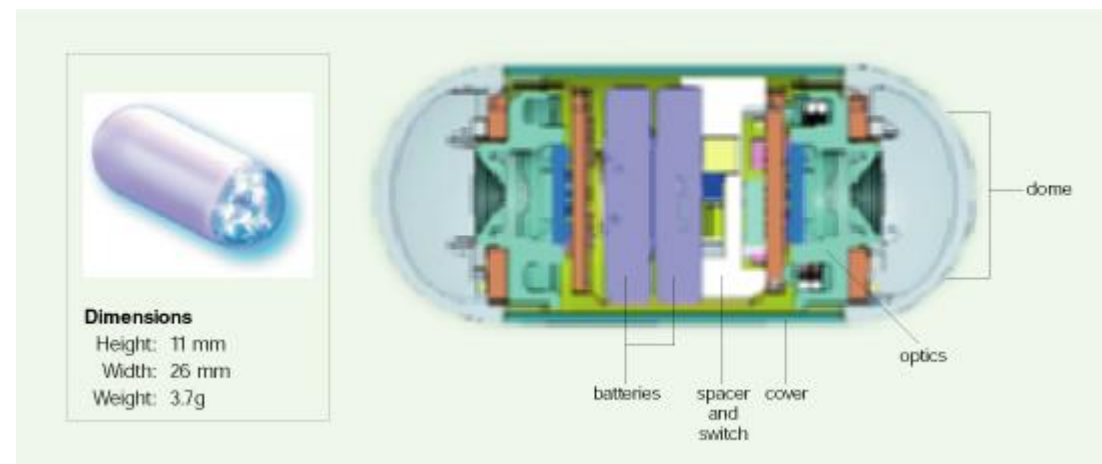


In-body electronics & Human Body Communication for example: Oesophageal capsule endoscopy



Human body communication (HBC) is a technique for transmitting signals between apparatus connected to a human body by using the human body having conductivity as a communication channel

JTC1 SC6 has a NWIP on HBC to support 6 Mbps data transfer rate using Frequency Selective Digital Transmission (FSDT) over galvanic coupling in 8~16MHz frequency band for transmission of images from inside the body.



Convergence of apparel and electronics value chains --- Smart Clothes

Fabric manufacturer



Manufacturer



Retail



Typical Users

Sportsmen
Cyclists, Runners etc
Caregivers
First Responders
Military



Electronic ink



Electronic ink printer

*Gartner (Nov 2014) – “smart clothing
Tractica (March 2015) – worldwide revenue
from smart clothing will exceed **\$600 million** by 2020*

Clothes will outsell phones

Smart Clothes can monitor body functions eg:

- Heart Rate
- Breathing Rate
- Muscle Fatigue
- Movement and Form
- Sweat

Wearable applications in clothing



Sports and Fitness

(institutional sports, individual sports, active lifecycle)

- Bio Feedback
- Performance Tracking
- Performance Enhancement
- Coaching and Development
- Injury Prevention, Detection and Recovery



First Responders, Medical and Military

- Preventative; Early Detection
- Rehabilitation; Self Monitoring
- FR/EMT; Safety and Prevention
- Military; Safety, Performance, Communication



Lifestyle

- Personal Enhancement
- Hands Free Multi Tasking
- Alternative Safe Commuting
- Entertainment; Music, Film and Gaming Industry
- Travel/Hospitality
- Education and Child Development

E-wearables – textiles – see Raleigh workshop proceedings

- Worldwide market for smart fabrics - \$2.25b with an annual growth rate of 18%
- US market for smart fabrics - \$1.016b with annual growth rate of 27%
- Market Segmentation
 - 27% for Transportation
 - 21% for Military
 - 20% for Industrial Commercial Uses
 - 17% for Sports and Fitness
- Electronics in clothing has great potential and various major companies are exploring the field eg Levi, Nike, Ultimo, Underarmor, Adidas etc