

Innovative smart services design from connected objects

Laboratoire d'InfoRmatique en Image et Systèmes d'information

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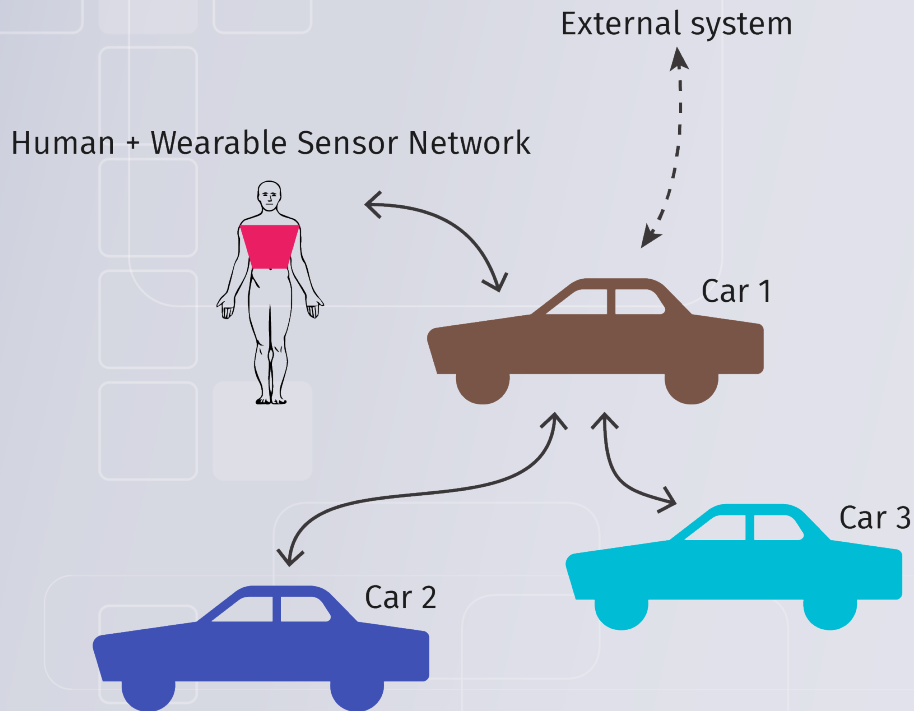
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Introduction



What is the scientific problematic?

- Context: Increase of communicating objects
- Problems:
 - Interoperability
 - How to handle the generated data (which can be big)
 - Limited resources
 - Cyber-physical properties
- Goal: Building Internet-of-Things (IoT) enabled systems

The detailed research problem

In order to build IoT enabled systems, we found that it is necessary to specify a **composable self-adaptable connected object model**.

This brings several research directions:

- How to **model connected objects**? (This will be the main focus as it is what I am currently working on)
- What are the **composability** requirements?
- How can a system **self-adapt**?

Connected Object Component Model

Connected Object Component

Information Model

<Connected Object>

Sw Attributes
Hw Attributes
Resources

Sensors: <Artifact>

Controllers: <Artifact>

Actuators: <Artifact>

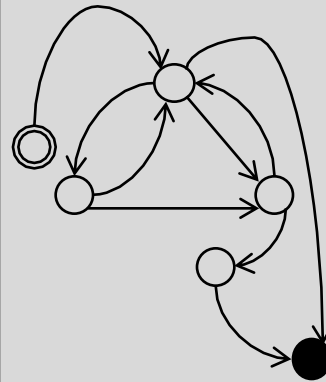
Plant :<Artifact>

Lifecycle

Control Loop

Self-Adaptive Loop

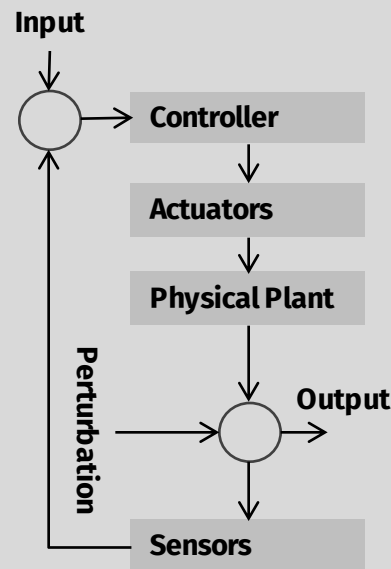
Lifecycle



<Services, Rules >

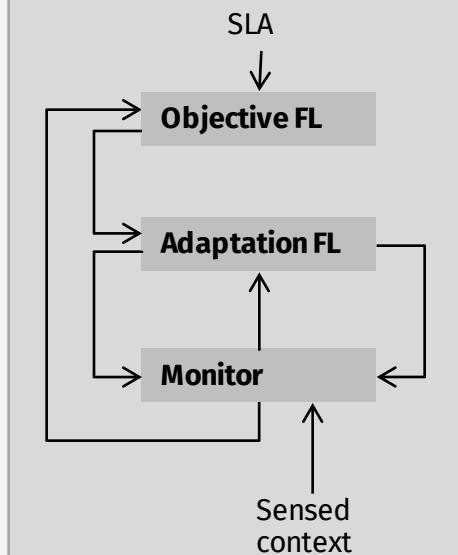
<States, Transitions>

Feedback Control Loop



[Hellerstein et al. 2004]

Self-Adaptive Loop



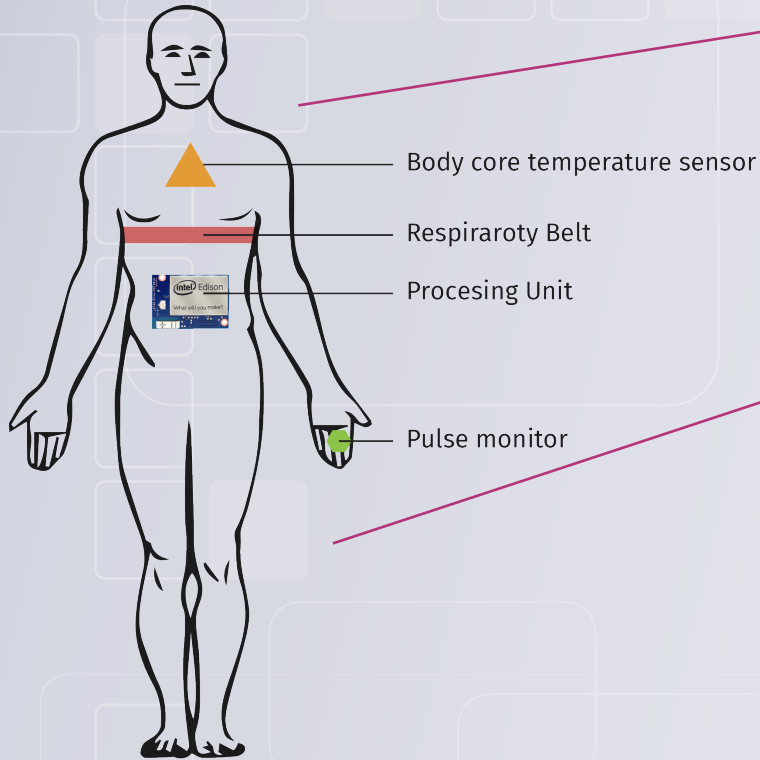
[Villegas et al. 2013]

Lifecycle: < transitions, services, rules >

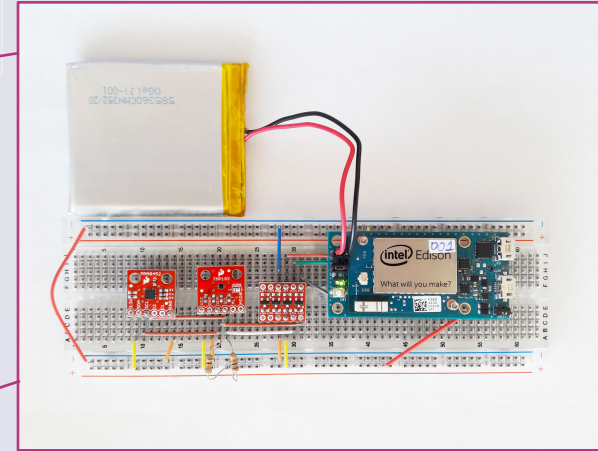
Control Loop: <Mission, Monitor, Effect >

Self-Adaptive Loop: <Objective, Adaptation, Monitor>

A prototype of connected object



Required biomedical sensors to derive sleepiness



Wi-Fi connectivity

