Model-Driven Framework for Design and Exploitation of Sensor Networks

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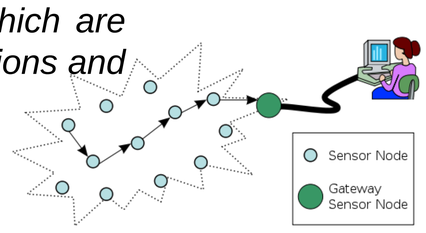
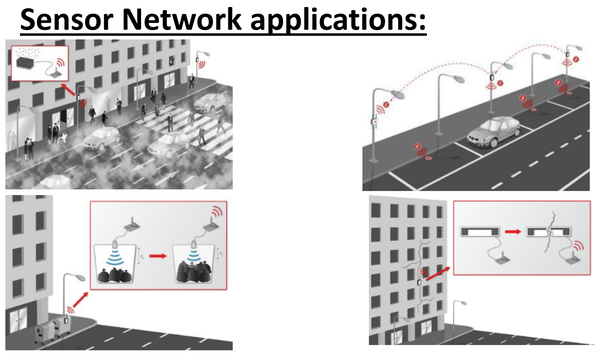
Context

Sensor networks *are a group of sensors which are used to monitor different environmental conditions and to collect, exchange, and process data.*



Sensor Network applications:

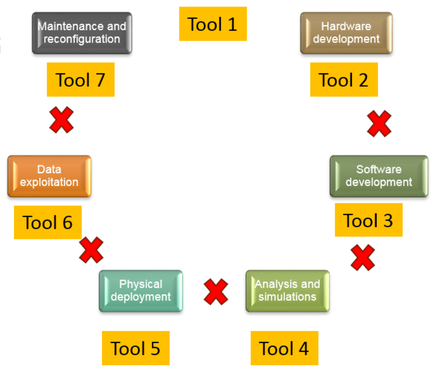


Challenges

Sensor network design is complex and requires several steps. Often, each step is described in a specific tool and separately therefore:

Challenges :

- Complexity to manage all development steps
- Need to master several tools
- Re-description of models in each tool
- A consistent development time
- Errors may be introduced



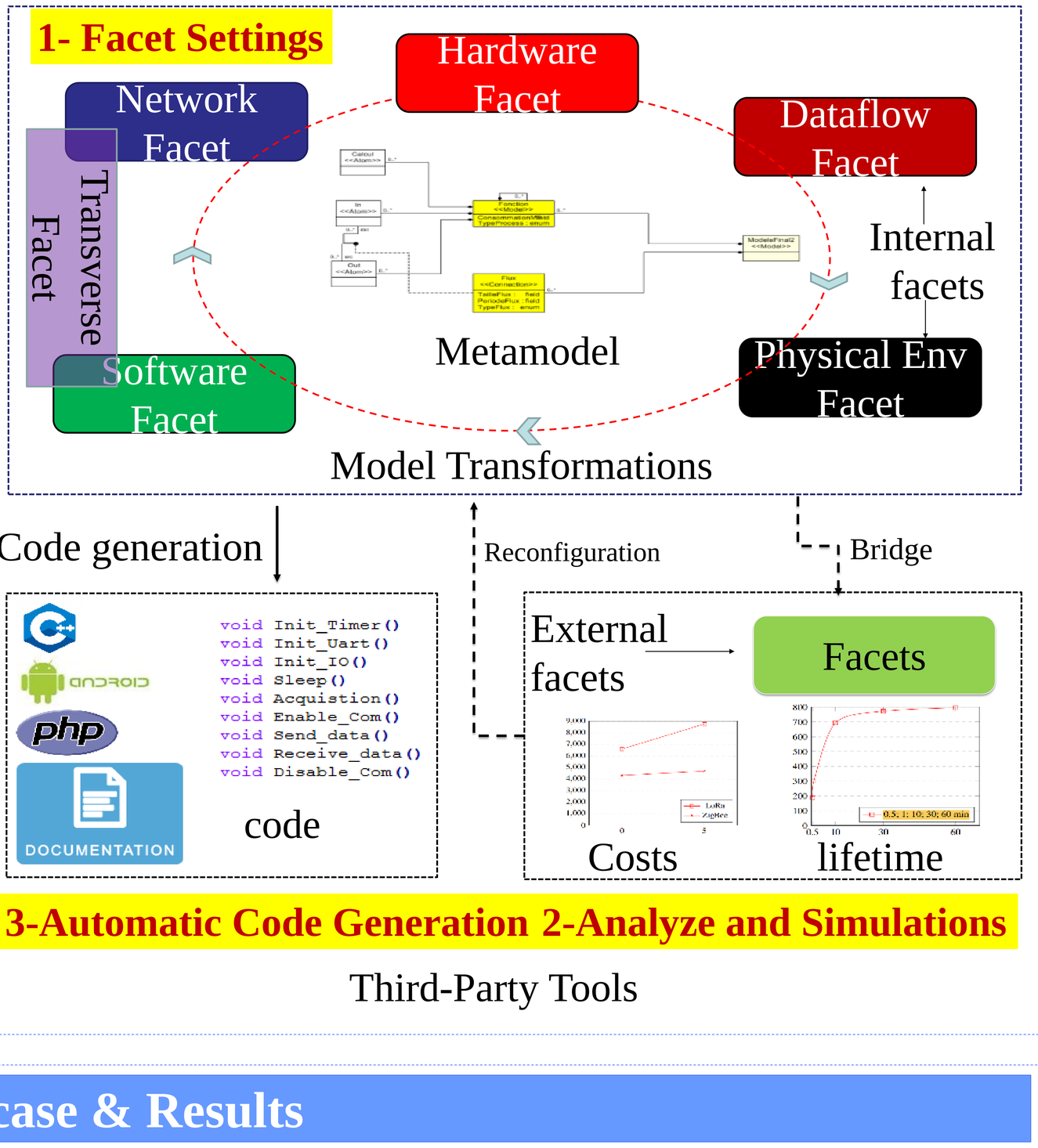
Methodology

Goal:

- Our aim is to develop an environment that covers the sensor network design cycle: from sizing to data exploitation.

How ?:

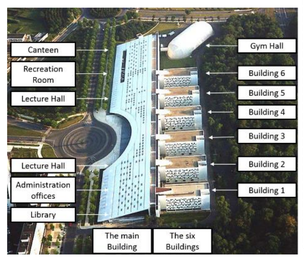
- Propose a new multi-facets methodology by using Model-Driven approach
- Internal facets, external facets, transverse facets.
- With model transformations to ensure the coherence of the facets
- Gateway to existing tools (e.g. simulators, etc.)
- Automatic generation of codes / configurations....

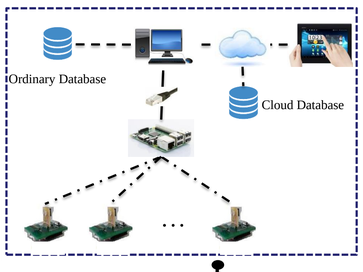


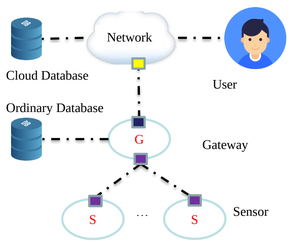
Use case & Results

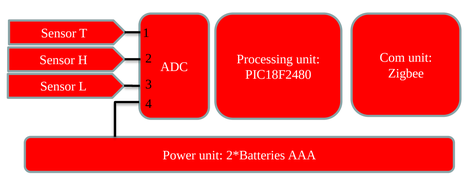
Smart building use case is used to validate our framework:

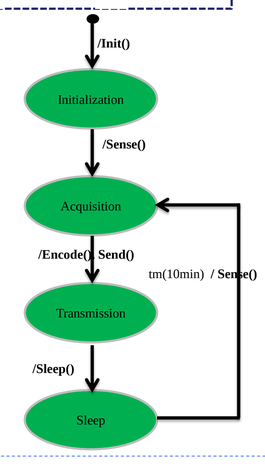
- 6 Buildings and main buildings.
- Each building has 5 floors.
- Five sensors per floor.

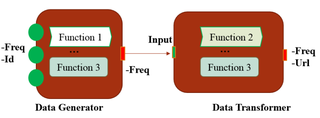


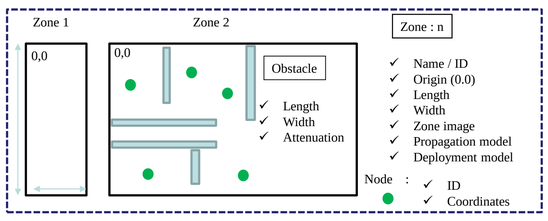


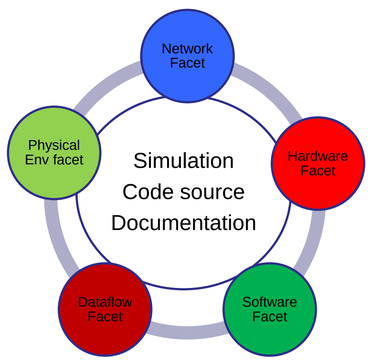


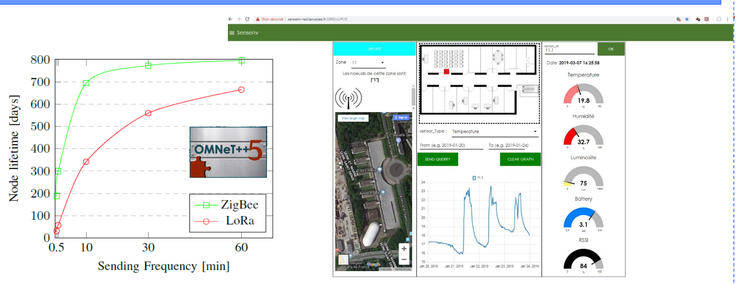


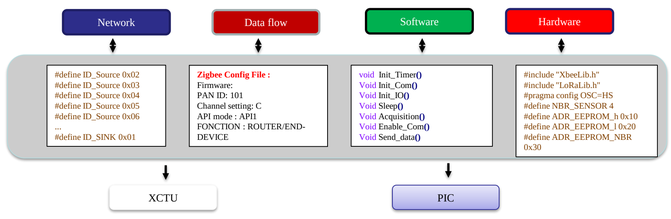












- Our framework generates Omnet++ simulation files from the facets.
- Our framework generates source codes for sensor nodes.
- Our framework generates scripts for data exploitation (php, sql, node-red).