

TITRE:

Towards a Development and Verification Methodology Dedicated to the Orchestration of Networked Devices**

EQUIPE/THEME: Phoenix

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MOTS-CLES:

Design language, Static Analysis, Generative Programming, Reliability, Quality of Service

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DESCRIPTION du SUJET:

A host of networked devices are populating smart spaces that become prevalent (e.g., building management, personal assistance, citizen safety) and large scale (e.g., train station, city, highway network). The ubiquity of smart spaces raises challenges in various computer science fields such as software engineering, program verification or networks. In addition, applications orchestrating networked devices become safety-critical systems because they intertwine with people.

The PHOENIX research group addresses these key challenges using techniques and tools from programming languages, generative programming and formal methods. In particular, we have developed DiaSuite, a development environment dedicated to the orchestration of networked devices and revolving around a design language. So far, this methodology provides little verification support, and has been mostly applied in small-scale smart spaces such as home or small buildings.

Thesis Project:

The purpose of this thesis is to propose concepts and tools for developing reliable applications orchestrating large-scale smart spaces. This development process will cover both the functional and non-functional aspects of these applications (*/e.g./*, dependability, quality of service) while providing specific verification support. One of the main scientific challenges will be to ensure the scalability of these verification techniques. To achieve this goal, it is essential to take into account both functional and non-functional requirements in the early stages of the development process, allowing early verification and requirements traceability. To make both development and verification systematic, this thesis will rely on domain-specific design languages, generative programming techniques and static analysis. The results of this thesis will be put into practice in the DiaSuite development environment.

This thesis is part of a project funded by a national agency. The goal

of this project is to develop an innovative communication technology, allowing the emergence of a new economic sector for large-scale smart spaces. The industrial partners of the Object's World project will provide us with real-size case studies in various application domains (/e.g./, smart cities, tracking of vehicles, healthcare, energy management).

References:* *

/1./Towards a tool-based development methodology for pervasive computing applications/

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/3./A Step-wise Approach for Integrating QoS throughout Software Development////Gatti Stéphanie; Balland Emilie; Consel CharlesIn

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