

# Internship: Design-driven Validation of Resilient Systems

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This work is part of a collaborative project with the ADAM research group (INRIA, Lille) and the TSF research group (LAAS, Toulouse). In this collaborative project, we are interested in the development of resilient systems. Resilience is defined as the ability of a system to stay dependable when facing changes. For example, a building management system (*e.g.*, anti-intrusion, fire detection) needs to evolve at runtime (*e.g.*, deployment of new functionalities) because its critical nature excludes interrupting its operation. Resilience concerns occur in various application domains such as civil systems (civil protection, control of water or energy, *etc.*) or private systems (home automation, digital assistance, *etc.*).

The objective of this internship is to propose a validation methodology for resilient systems. This methodology will rely on a design paradigm dedicated to Sense/Compute/Control (SCC) applications. The Phoenix research group has developed an integrated tool-based development approach that covers the whole development cycle of SCC applications. In particular, the testing stage is supported by a 2D simulator leveraging the specification of the SCC application. The validation methodology proposed in this internship will be integrated in this simulator to offer specific support for testing dependability properties (*e.g.*, fault injection, runtime evolutions).

## Phoenix research group

A host of networked devices are populating smart spaces that become prevalent in an increasing number of areas, including supply chain management (*e.g.*, parcel tracking), monitoring (*e.g.*, building surveillance and patient monitoring) and home and building automation (*e.g.*, control of energy consumption). This situation raises a number of challenges (1) safety and security because of the interweaving of these smart spaces in our daily life, (2) productivity because of a high demand of applications matching the wide range of user needs, and (3) abstraction because of the combination of expertise areas involved in smart spaces.

To address these challenges, the Phoenix research group develops a software engineering approach that is dedicated to services orchestrating networked devices:

- Specification of robust orchestrating services based on an innovative design-driven development methodology,
- Study of the communication layers underlying these services to improve flexibility and performance,
- Application to concrete areas such as home automation or avionics to validate our approach.

The Phoenix Research Group is affiliated with INRIA and LaBRI/University of Bordeaux. More information about the research activities of Phoenix can be found at <http://phoenix.inria.fr> and <http://diasuite.inria.fr>.

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