



**United Technologies  
Research Center**

## **Cyber-Physical Systems Risk Assessment Internship Thesis**

Advanced Laboratory on Embedded Systems (ALES) is a United Technologies Research Center ([www.utrc.utc.com](http://www.utrc.utc.com)) company with offices in Rome and Trento, Italy, specialized in model based technologies and methodologies for the design and verification of distributed safety critical embedded systems. ALES competences cross several application domains, such as avionics, refrigeration and building automation, and several disciplines, such as formal and run-time methods for verification of hybrid and discrete systems, requirement, safety and security analyses, and design flow integrations. ALES provides services and innovation to an international network of UTC customers and offers a collaborative and stimulating working environment for candidates looking for a challenging and valid career.

### **Topic**

ALES develops Model-Based methodologies and technologies for the design, verification and testing of systems exposing complex interactions between physical and computational/cyber components (Systems of Cyber-Physical Systems – SoCPS). The security assessment of complex SoCPS is an open research challenge due to their inherent complexity and unexpected emergent interaction that may exist between distributed services, IoT devices and humans in the loop. A concrete example of such complexity is given by smart buildings in which the different types of sensors, actuators, monitoring cameras and humans are coordinated and supervised by complex control systems that needs to guarantee the building security and privacy without compromising any aspect of people safety posing challenges in terms of engineering, regulatory and economic aspects.

During the internship thesis the candidate will review the existing literature on SoCPS security and attacks as well as suitable risk assessment methods with particular emphasis on model-based methodologies. Then, he/she will develop a detailed use case centered on smart building domain - such as an intelligent evacuation system - on which at least two state-of-the-art Risk Assessment methodologies will be applied. The objective is to evaluate the effectiveness of the selected methodologies and to identify strength and gaps. On the basis of this assessment he will identify the most adequate methodology and propose improvements to fill the gaps and contribute to the state-of-the-art on this matter.

### **Additional information**

**Expected duration:** 4-6 months

**Candidate background:** Computer Science education with skills in algorithms, security risk assessment, programming.

**Supervisor:** Orlando Ferrante

**Administrative point of contact:** Donatella Santillo

### **Contacts & Application**

Applicants should send the information to the following contact: [ales.hr@utrc.utc.com](mailto:ales.hr@utrc.utc.com)

Applicants should add to their CV the following consensus statement to allow ALES to treat the information in compliancy with the Italian privacy law:

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