

2021-04099 - PhD Position F/M Labex Persyval of the Université Grenoble-Alpes - Patch analysis of IIoT components

Contract type : Fixed-term contract
Level of qualifications required : Graduate degree or equivalent
Fonction : PhD Position

About the research centre or Inria department

Labex Persyval of the Université Grenoble-Alpes

Context

This problem is addressed by the D-IIoT project, supported by the Labex Persyval of the Université Grenoble-Alpes, and gathering several partners (LIG, INRIA Rhône-Alpes, Verimag and CEA LIST).

The grant is provided by the University Grenoble-Alpes via the Labex Persyval. The amount corresponds to a standard French PhD grant.

PERSYVAL-lab federates 800 researchers and academics from 10 laboratories in Grenoble working on computer science, hardware architecture, signal processing, control and mathematics towards a common scientific goal: build secure, reliable and efficient cyber-physical systems combining "smart" devices interconnected and interactive virtual objects.

Assignment

In this broad context, this PhD objective is to develop a patch analysis framework able to predict and anticipate the behavioral when upgrading the code of an IIoT component. This impact should encompass both safety and security properties.

Main activities

The approach proposed is to leverage existing techniques (like shadow symbolic execution [1] and differential fuzzing [2]) in this specific application context of close-source networked embedded systems. The analysis will be partly driven by some formal models of the whole IIoT environment, and it will rely on reverse engineering, code instrumentation and monitoring techniques to obtain a faithful enough dynamic analysis environment. The expected outcomes are dedicated patch analysis techniques and methodologies for IIoT applications, together with a tool prototype. Case studies will be provided by the D-IIoT project and will consist in industrial applications as those used in smart grids or manufacturing plants.

References:

[1] Tomasz Kuchta, Hristina Palikareva, and Cristian Cadar.

Shadow symbolic execution for testing software patches.

ACM Trans. Softw. Eng. Methodol., 27(3):10:1–10:32, 2018.

[2] Yannic Noller, Corina Pasareanu, Marcel Böhme, Youcheng Sun, Hoang Lam Nguyen, and Lars Grunske. *Hydiff: Hybrid differential software analysis*. In 42st International Conference on Software Engineering, 2020.

Benefits package

Social security coverage

Remuneration

The grant is provided by the University Grenoble-Alpes via the Labex Persyval. The amount corresponds to a standard French PhD grant.

General Information

- **Theme/Domain :** Distributed Systems and middleware
Software engineering (BAP E)
- **Town/city :** Grenoble
- **Inria Center :** CRI Grenoble - Rhône-Alpes
- **Starting date :** 2022-01-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2021-12-20

Contacts

- **Inria Team :** CTRL-A
- **PhD Supervisor :**
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About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

Instruction to apply

Defence Security :

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy :

As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.