2018-00470 - Explaining faults in dynamic networks - Post-Doctorant Inria Grenoble Research center

**Contract type:** Public service fixed-term contract  
**Level of qualifications required:** PhD or equivalent  
**Function:** Post-Doctoral Research Visit

**About the research centre or Inria department**
Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

**Context**
The postdoc will be hosted by the SPADES team at INRIA Grenoble and collaborate with Gregor Goessler (INRIA Grenoble, SPADES team), Armen Aghasaryan (Nokia Bell Labs, Nozay), and Eric Fabre (INRIA Rennes, SUMO team).
The SPADES project-team aims at mastering the complexity and dependability of networked embedded computing systems.

**Assignment**
Explaining faults in dynamic networks

Networks such as IoT and virtualized telecommunication networks adapt to changes in the physical environment, component faults, or user requests, by dynamically reconfiguring their topology. In the case of failures, traditional root cause analysis and model-based diagnosis techniques fall short of the complexity of such networks: (1) they rely on a known, static model of the network; and (2) they are generally unable to distinguish alarms and component faults that crucially contributed to the failure from less pertinent ones, resulting in an overwhelming quantity of information presented to the operator. The goal of this project is to develop techniques for causal analysis of failures in programmable networks.

**Objectives:**

1) Propose a realistic failure scenario in an IoT or virtualized network, and model it in an appropriate formalism.

2) Study existing approaches to counterexample explanation and causal compression, and propose their extension to concurrent, possibly probabilistic models.

3) Investigate the application to dynamic networks by extending the approach with model discovery, learning, and/or construction from code.
4) Implement the proposed approach and apply it to the case study.

5) If time permits, study how to reuse or adapt existing techniques for distributed diagnosis for a
decentralized construction of the explanation.

Informations supplémentaires:
https://team.inria.fr/spades

Main activities
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Skills
Candidates must have a PhD in computer science. Expertise in formal methods and basic knowledge
in programmable networks are required.

Some knowledge on machine learning techniques will be appreciated.

Justification: The project requires competences in several domains (formal methods, programmable
networks, machine learning) that the candidate has to acquire in order to tackle all aspects of the
subject. In particular, the required work should combine a theoretical development and its
implementation and application

Benefits package
• Subsidised catering service
• Partially-reimbursed public transport
• Social security
• Paid leave
• Flexible working hours
• Sports facilities

Remuneration
Gross salary: 2650 Euros per month

General Information
• Theme/Domain: Embedded and Real-time Systems
  Scientific computing (BAP E)
• Town/city: Montbonnot
• Inria Center: CRI Grenoble - Rhône-Alpes
• Starting date: 11/1/18
• Duration of contract: 1 year, 4 months
• Deadline to apply: 3/31/18

Contacts
• Inria Team: SPADES
• Recruiter: Goessler Gregor / gregor.goessler@inria.fr

Conditions for application
Starting date: 1st November 2018, duration: 16 months.
Applicants should hold a PhD (defended between 1st September 2016 and 31st July 2018) in Systems and Control or Applied Mathematics.

Applications have to be made on-line on the Inria web site before end of March.

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**Contact:** Gregor Goessler <first.last@inria.fr>

**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.