2018-00369 - [PostDoc2018] Hybrid Communities for the Web of Things

Level of qualifications required: PhD or equivalent
Fonction: Post-Doctoral Research Visit

About the research centre or Inria department

The Inria Sophia Antipolis - Méditerranée center counts 37 research teams and 9 support departments. The center's staff (about 600 people including 400 Inria employees) is composed of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrators. 1/3 of the staff are civil servants, the others are contractual. The majority of the research teams at the center are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Six teams are based in Montpellier and a team is hosted by the computer science department of the University of Bologna in Italy. The Center is a member of the University and Institution Community (ComUE) "Université Côte d’Azur (UCA).

Context

Inria, the French National Institute for computer science and applied mathematics, promotes “scientific excellence for technology transfer and society”. Graduates from the world’s top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

This position is attached to Wimmics, a joint research team (Inria, University Côte d’Azur, I3S, CNRS) located in Sophia-Antipolis. Wimmics had 40-50 members in 2017 all working on bridging social and formal semantics on the Web and in particular studying AI and semantic Web approaches to support epistemic communities online.

Assignment

In its evolution, the Web has motivated the need for collectives of people and autonomous agents: from organizing the Web through directories maintained by people (e.g., the now defunct Yahoo! Directory, DMOZ) to automatic search engines (e.g., Google) that enhance people's search through the use of crawlers and information retrieval algorithms, or to socio-technical systems (e.g., Wikipedia) in which people and software agents work together to improve the quality of published material [7]. The more recent developments towards a Web of Things (WoT) [2] enable Web services to sense and act on the physical world, which further stresses the need for autonomous agents that can achieve their design objectives in a flexible manner such that they can cope with the heterogeneity and dynamicity of WoT environments [3,4]. The Web has now become a world-wide environment that spans across the physical-digital space and supports collectives of people and autonomous agents in pursuit of individual or common goals – we refer to such collectives as hybrid communities [5].

Research on autonomous agents and multi-agent systems (AAMAS) already provides models and technologies that can be applied to design and develop communities of autonomous agents [6]. In addition, the past decades have also witnessed significant progress towards a semantic Web that can support autonomous agents [7,8]. However, there is still a gap that prevents merging the research lines from these two communities [3,10]. A challenge that is central to bridging this gap is to define an ontological alignment between core concepts from AAMAS and Web research, and in particular an alignment of the concepts of the Multi-agent and distributed AI architectures and the Web architecture. Such an alignment would enable both people and autonomous agents to reliably perceive, reason, and act on WoT environments that span across the physical-digital boundary.

The main research question investigated during this postdoctoral research visit is: What is an ontological alignment between concepts from AAMAS and Web research that is sufficient to enable the deployment of hybrid communities of people and autonomous agents in WoT environments?

References


General Information

- Theme/Domain: Data and Knowledge Representation and Processing Web development (BAP E)
- Town/city: Sophia Antipolis
- Inria Center: CRI Sophia Antipolis - Méditerranée
- Starting date: 11/1/18
- Duration of contract: 1 year, 4 months
- Deadline to apply: 3/25/18

Contacts

- Inria Team: WIMMICS
- Recruiter: Gandon Fabien / fabien.gandon@inria.fr

The keys to success

- Given the relatively short timeframe for this assignment, it is essential that the candidate has already demonstrated strong expertise in REST and the Web architecture.
- Given the broad scope of this assignment, it is essential that the candidate has a can-do attitude and is at ease with studying and integrating models and technologies from two very large fields, i.e. AAMAS and Web research. Having a background in both fields would be ideal.
- Key traits for maximizing the research output of this assignment include: striving for excellence in research, demonstrated interest in intelligent systems for the Web, and the ability to self-motivate and prioritize tasks.

Conditions for application

Application file: Applications must be submitted online on the Inria website. Collecting applications by other channels is not guaranteed.

Before to apply, and preferably before march 20, it is strongly recommended to contact the scientific in charge of this offer.

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
Main activities

The main activities of this postdoctoral position include:

- analysis of similarities and mismatches between architectures for multi-agent systems (MAS) and the Web architecture;
- ontological definition and alignment of core concepts from MAS and the Web architecture;
- development of enablers (e.g., models, ontologies, protocols, algorithms) required for designing and deploying hybrid communities in WoT environments;
- reference implementations of the defined enablers, and the deployment of a hybrid community demonstrator in the SophiaTech campus;
- publishing of key findings and results in top conferences and journals from relevant communities (AAMAS, JAAMAS, WWW, ISWC, ESWC, SWJ, JWS, IoT, WoT etc.).

Skills

Technical skills and level required:

- PhD in Computer Science with a specialization in the WoT, Web architecture, Semantic Web, or AAMAS.
- Strong understanding of REST and the Web architecture. Good knowledge of WoT research and standardization efforts.
- Good knowledge of Semantic Web standards.
- Good knowledge of architectures and meta-models for MAS.
- Practical software engineering experience is a plus.
- Experience with agent programming languages and MAS platforms is also a plus.

Languages:

- Good English skills in both writing and communication.
- French skills are a plus

Relational skills:

- Autonomous
- Comfortable with international communication and cooperation

Other valued appreciated:

- Knowledge of standardization bodies and processes

Benefits package

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

**Remuneration**
Gross Salary: 2650 brutto per month