Title: Context-aware search, discovery and querying of web-enabled sensors and actuators in Ambient Intelligence applications

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Description
In the domain of **Ambient Intelligence** and the **Web-of-Things**, an important research direction is the creation of **scalable, long-lived information management infrastructures** to facilitate **search/discovery** and **querying** of **context information retrieved from physical or virtual sensors** deployed in smart environments (e.g. smart homes/offices, smart cities).
The aim in such scenarios is to enable **controlled autonomy** in **intent-driven interactions.** As an example, think of a Google Assistant like app that wants to *wake up* its user (wake up is the *goal/intent*), who is sleeping in a hotel room (i.e. not his home). The digital assistant needs to *discover* what means there are to do this (e.g. turn on a smart light bulb, automatically raise the blinds). It can only discover these options based on its *context* (it is the digital assistant of a person that is registered with the hotel and has been detected in *this particular* room).

The objective of this work is the development of a **web-enabled context management system** that enables the **context aware search/discovery and status query of actuators and sensors** (e.g. automated blinds in lab 308 of PRECIS, Philips Hue smart lamp, luminosity sensors) installed in a smart environment (e.g. the AI-MAS lab in PRECIS).

The specific goals are:

- Define an explicit *semantic representation* for ***shared context*** (e.g. the digital assistant shares the *location context* with the smart light bulb and the blinds), as well as for ***intended use of context information*** (the capabilities of the light bulb and blinds may only be discovered for specific usages - e.g. increase luminosity in the room)
- Implement a scalable web-based service by which search, discovery and querying of context information can be performed by respecting ***locality of context consumption rules*** (i.e. only when elements of *context* and *intent of use* are shared between producer and consumer) [Sorici et al, 2019]
- Integrate *multi-agent specific concepts and organizational principles* into the design of the intent-driven interactions

This research subject continues existing work.

Keywords: Semantic Web, RDF Streams, Linked Data, W3C standards in sensor and actuator descriptions, RESTful web-services

Bibliography
[Sorici et al, 2019] Sorici, Alexandru, Andrei Olaru, and Adina Magda Florea. "Towards Enabling Internet-Scale Context-as-a-Service: A Position Paper." In Companion Proceedings of The 2019 World Wide Web Conference, pp. 668-671. ACM, 2019.