Septembre 2020

Student/Intern project

Interoperability of IoT components in smart cities

Smart Cities are augmented environments capable of utilizing Internet of Things (IoT), in which computational intelligence is ubiquitous to provide people with contextual, proactive and personalized services. These environments will provide ubiquitous information and services to promote well-being as well as better management of the city's resources.

An IoT framework is being developed at the AMI-Lab to promote better delivery of services in Smart Cities. We mainly target helping aging people to lead an independent and purposeful life, through ambient assistive technologies. The framework includes software components to integrate context from IoT devices. These components implement diverse protocols (e.g., Zwave), and include processes to persist and interchange context. Our platform similarly manages emerging protocols providing context outdoor (e.g., Bluetooth low energy) as well as technologies providing services (e.g., IoT services, cloud computing). All context and services are integrated, pre-processed and kept in a knowledge base, to be consumed through the city. The design incorporates design patterns and optimization of algorithms to deploy in kiosks through the city, with small computation capacities (i.e., processor, memory).

Our team has also deployed diverse IoT devices in the city of Sherbrooke (e.g., sensors, actuators). We are also currently extending our platform to include various outdoor technologies to provide a solution that integrates many IoT objects (i.e., smart objects through kiosks and smartphones). These IoT objects involve diverse interfaces, inputs/outputs, services, and data formats to interoperate (i.e., sharing resources and services). The IoT interoperability is challenging because every day new services are available on the Internet to automatize user activities (e.g., social network services, smart home services, health services, environment services). The diversity of services brings the necessity of a service-IoT standardization for interoperability.

Keywords

Interoperability, Smart City, Internet of Things, REST API, Android, Swift Sensors & Beacons, Dynamic and adaptable systems, Context aware services.

Required skills/background

- Strong motivation towards challenging projects
- Ease in programming
- Knowledge of Web services + Recommended knowledge of software design patterns
- Recommended skills in Linux, embedded systems

Role of the student/Intern

The student/Intern project involves analyzing the diverse types of services for a subsequent design of an application programming interface (API) to standardize the service access (publish and consume). The types of services are useful services for IoT, e.g., services with authentication (e.g., Facebook, mail and calendar), services with calls over the internet with a key (e.g., OpenWeatherMap), services with calls over the internet without a key (e.g., reading RSS), smart home/smart city services (e.g., cloud services, services provided by our framework). Afterward, the student must develop a prototype to demonstrate the functionality of the API. The API and components should be developed in C++ and deployed on a Raspberry PI platform (Linux).

Application

Interested applicants email a detailed CV, transcripts and motivation letter to the lab director. The successful candidate will be contacted shortly after processing the received applications.