



Framework for Service Composition Based on Ontologies for the Aggregation of Knowledge and Information for Intelligent Buildings (FCINT)

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Project Progress

The **FCINT project**, co-sponsored by the European Fund for Regional Development and Romania's Government (ID551, cod SMIS-CSNR 12038), is hosted by the Polytechnic University of Bucharest.



University Politehnica of Bucharest

During this quarter of its funded activity, the FCINT project focused on: tool design (partial), scenario implementation and demonstration and system

evaluation in the lab (partial), publication on portal and maintenance of language for ontology description (partial), publication on portal of services and interface protocols (partial), further development of wiki portal (partial) and testing and quality control.

So far, the FCINT team has successfully delivered partial solutions that include multiple components such as service composition and optimization, scenario implementation and demonstration, system evaluation through simulation, ontology modelling language, service portal, and wiki portal. Future activities are geared toward completing and enhancing those features to provide customers with services for smart building management.



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FCINT Publications

Radu-Daniel Vatavu, Catalin Marian Chera, Wei-Tek Tsai (2012) *Gesture Profile for Web Services: An Event-driven Architecture to Support Gestural Interfaces for Smart Environments*. In Proc. of the International Joint Conference on Ambient Intelligence - Aml'12 (Pisa, Italy, Nov. 2012). In F. Paterno et al. (Eds.): LNCS 7683. Springer-Verlag Berlin Heidelberg, pp. 161-176.

Gesture-based interaction has known increasing popularity in the measure that low cost acquisition devices such as Wii and Kinect have been introduced. However, gesture recognition algorithms are the appanage of machine learning experts, not ambient intelligence researchers which may be interested in prototyping gesture interfaces for new smart environments. This paper proposes GPWS (Gesture Profile for Web Services), a service-oriented architecture designed to assist implementation of gesture-based control applications. As human gestures are naturally event-driven, GPWS was also designed as an event-driven architecture (EDA) implementing event generation, processing, logging, and publishing in conjunction to key points in gesture processing. We discuss two iterative designs for GPWS, analyze their performance, and demonstrate GPWS for a gesture-controlled smart home application.

Chera C., Tsai W.-T., Vatavu R., *Gesture Ontology for Informing Service-Oriented Architectures*. In: 2012 IEEE International Symposium on Intelligent Control (ISIC), part of 2012 IEEE Multi-Conference on Systems and Control (IEEE MSC'2012), pp. 1184-1189, ISBN: 978-1-4673-4599-6, 2012, Dubrovnik, Croatia.

Into the paper, we present a system engineering approach for designing Service-oriented Architectures (SOA) for software applications that use gesture commands. The approach employs ontology for gesture-based interaction which was designed on three levels: user execution, system implementation, and gesture reflection. The ontology borrows concepts from several research communities interested in gestures such as human-computer interaction, pattern recognition, and cognitive psychology. We show how the ontology can be used in order to inform the design of Service-oriented Architectures for engineering new systems and applications and describe a software architecture design for controlling smart homes with gesture commands.

Monica Dragoicea, Laurentiu Bucur, Monica Patrascu, *Service Orientation for Intelligent Building Management: an IoT and IoS Perspective*, Proceedings of the UNITE 2nd Dcotoral Symposium, R&D in Future Internet and Enterprise Interoperability, 11-12 Octombrie, Sofia, Bulgaria, Ed. Ricardo Jardim-Goncalves, Kamelia Stefanova, pag. 79-86, ISBN: 978-619-160-040-3, AVANGARD PRIMA, Sofia, 2012.

The present work introduces a research perspective on developing Intelligent Building Management solutions based on a service-centric conceptual framework that the authors previously developed. The proposed conceptual framework relied on the service oriented architecture approach and its related supporting technologies, tools, mechanisms that



facilitate discovery, integration, processing and analysis of datasets collected from various home appliances. In order to further develop the above mentioned service-centric conceptual framework, this paper proposes an extensive integration of emergency protection systems that take could into account a varied range of hazards and disasters, from small fires to earthquakes.

According to this new way of approaching the more broader concept of smarter building, according to the basic research principles of the Internet of Things and Internet of Services, potential users might be able to compose services useful to them, to match their own needs at a particular moment and context, or to access services through at hand devices in situational scenarios. In this respect, the paper makes a broad introduction on perspectives and terminology dedicated to the Intelligent Building Management research domain, creating an integration path in the perspective of IoT and IoS.

Monica Dragoicea, Laurentiu Bucur, Wei-Tek Tsai, Hessam Sarjoughian, *Integrating HLA and Service-Oriented Architecture in a Simulation Framework*, ccgrid, pp.861-866, 2012, 12th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (ccgrid 2012), 2012

The High-Level Architecture (HLA) is the de-facto standard in simulation interoperability. This paper presents a possible way for HLA to integrate with a service-oriented architecture (SOA) in the context of a smart building project. The paper discusses the design of an HLA federate for the inclusion of a service oriented smart building controller in the simulation loop.

FCINT Info

FCINT project website: <http://www.fcint.ro>

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