

A Semantic Reasoning Engine for IoT and Smart Cities Applied to the Energy domain

How to deduce meaningful knowledge from sensor data?

- Our approach: S-LOR (Sensor-based Linked Open Rules)
 - A dataset of rules to interpret IoT data -
 - A subset of rules can be selected according to specific sensors, applicative domains, etc.
 - A rule-based reasoning engine based on the Jena Inference Engine



Parties prenantes



Auteurs

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Partenaires





Jena is a framework to build Semantic Web applications

- An approach for sharing and reusing interoperable rules to encourage interoperability inspired from the Linked Open Data and the Linked Open Vocabularies
- Reusing the domain knowledge from the Linked Open Vocabularies for Internet of Things (LOV4IoT)
- Reducing development time of IoT applications -

Demonstrator:

Sensor	Projects
Thermometer *	Get project Get rule Potentiallylcy - IF Precipitation GREATHER_THAN 0.1 mm AND m3:Temperature LOWER THAN 32 degF THEN Potentiallylcy
	BelowRoomTemperature - IF m3:Temperature greaterThan 10 AND lessThan 20 m3:DegreeCelsius THEN BelowRoomTemperature
Light/Illuminance Sensor Used in iPhone4 to adjust the brightness of the screen.	Get project Get rule Sleeping Riboni - if location = bedroom AND m3:Luminosity lessThan 40 lux AND sound lessThan 30 db then home:activity = home-dataset:Sleeping
	LightPresence - if presence=yes THEN turn light actuator on - http://sensormeasurement.appspot.com/RULES/LinkedOpenRulesHome.txt HighLighting - IF m3:Luminosity greaterThan 750 and LowerThan 2000 m3:Lux THEN HighLighting - http://sensormeasurement.appspot.com/RULES/LinkedOpenRulesHome.txt MediumLighting - IF m3:Luminosity greaterThan 150 and LowerThan 750 m3:Lux THEN MediumLighting

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Ongoing & Future Work:

- http://sensormeasurement.appspot.com/RULES/LinkedOpenRulesHome.txt LowLighting - IF m3:Luminosity greaterThan 20 and LowerThan 150 m3:Lux THEN LowLighting

http://sensormeasurement.appspot.com/RULES/LinkedOpenRulesHome.txt

- Combining the M3 taxonomy of sensors with the SEAS ontologies
 - Compliancy with the SEAS ontology (e.g., SmartMeter ontology, Pollution ontology)
 - Adding sensors specific to the energy domain within our dictionnary based on SEAS ontologies
 - Adding rules specific to the energy domain
- Real-time sensor datasets Apply the approach on real-time energy datasets
- Collaboration with University of Oulu, Finland Semantic Reasoning for IoT
- Automatic ontology matching Usage of ontology matching tools to integrate complementary ontologies (SAREF, WoT ontology, etc.)
- More Impact: Being able to provide a generic approach for other related projects (M3) framework, SEG 3.0 methodology, FIESTA-IoT H2020 EU project, OpenSensingCity and Standardizations).

References:









S-LOR has been presented at WWW2017

- Sensor-based Linked Open Rules (S-LOR): An Automated Rule Discovery Approach for IoT Applications and its use in Smart Cities. 3rd International ACM Smart City Workshop (AW4city) in conjunction with WWW 2017 [Gyrard et al. 2017]
- Semantic Web meets Internet of Things (IoT) and Web of Things (WoT) [2nd Edition]. WWW 2017 Tutorial [Gyrard et al. 2017]
- Demo paper: Helping IoT application developers with Sensor-based Linked Open Rules. 7th International Workshop on Semantic Sensor Networks, in conjunction with ISWC 2014 [Gyrard et al. 2014]
- Semantic Reasoning for Context-aware Internet of Things Applications. IEEE Internet of Things Journal [Maarala, Su et al. 2016]
- Demonstrator: http://linkedopenreasoning.appspot.com/

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