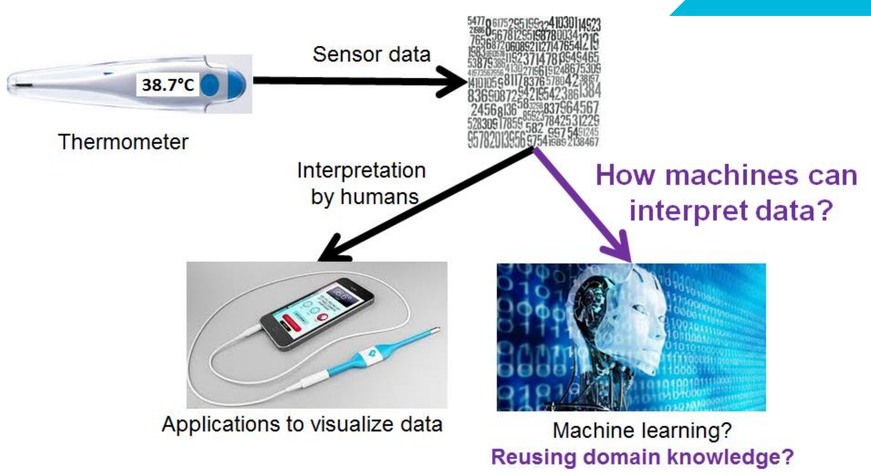
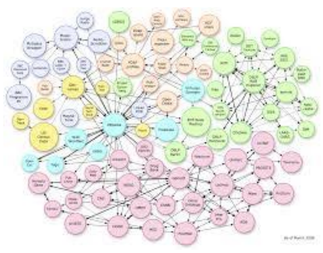
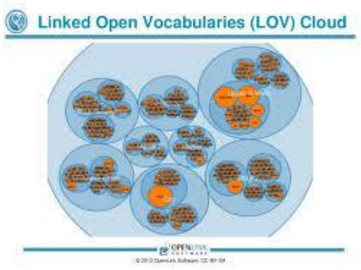
Institut Mines-Télécom

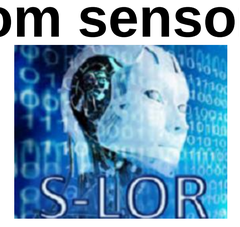
A Semantic Reasoning Engine for IoT and Smart Cities Applied to the Energy domain







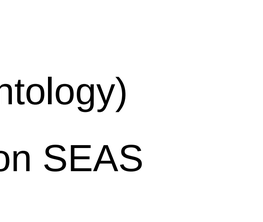
How to deduce meaningful knowledge from sensor data?



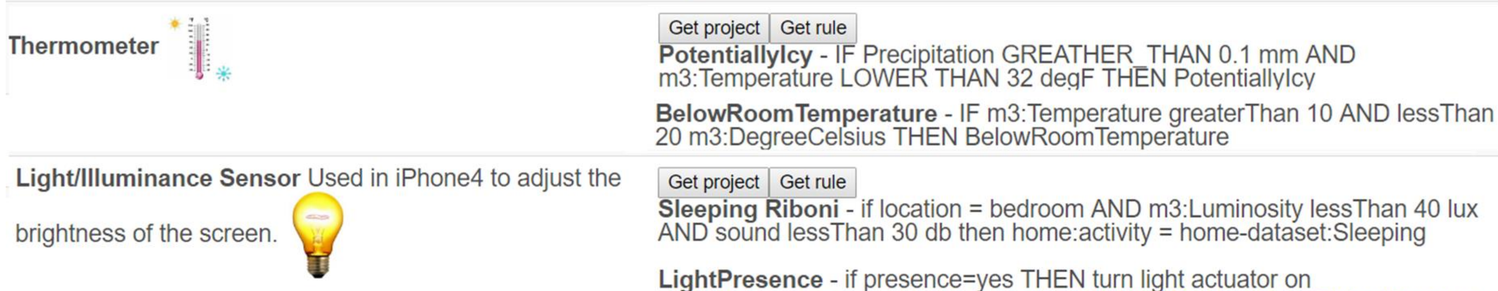
► **Our approach: S-LOR (Sensor-based Linked Open Rules)**

- 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

  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:



Ongoing & Future Work:

► **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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