Overcoming heterogeneity with the Web of Things in SEHM

Second year review

Fragmentation in SEHM

- **Methods** to gather data: visual inspection, wireless sensors, wired sensors ...
- **Models** to predict structural damage
- Different **data format**
- Distributed or centralized **computing architecture**
- A variety of **communication protocols**
- **Structure properties** itself: size, material, shape, accessibility, age, type...

The Web of Things (W3C)

- Use a semantic approach to describe software actors and software architecture
- The Thing Descriptor as fundamental building block. It describes:
  - Thing capabilities (Actions, Properties, Events)
  - How to have access to them
- Interoperability

TDs enable **machine-to-machine** communication in the Web of Things. Second, TDs can serve as a common, uniform format for developers to document and retrieve all details necessary to **access** IoT devices and make use of their data

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Goal

Build an innovative IoT architecture focused on smart structural health monitoring employing Web technologies and Open Data philosophy.

Open points

- Build a descriptive software model of the monitoring process
- How to seamlessly integrate other data sources or models like BIM
- How to effectively discover sensors and structures inside the Web of Structures
- How the software architecture influence the development of applications (machine learning, impact detection…)
- Use the improvements offered by the platform to build a general-purpose visualization tool for damage or impacts

Projects

Software built during this year

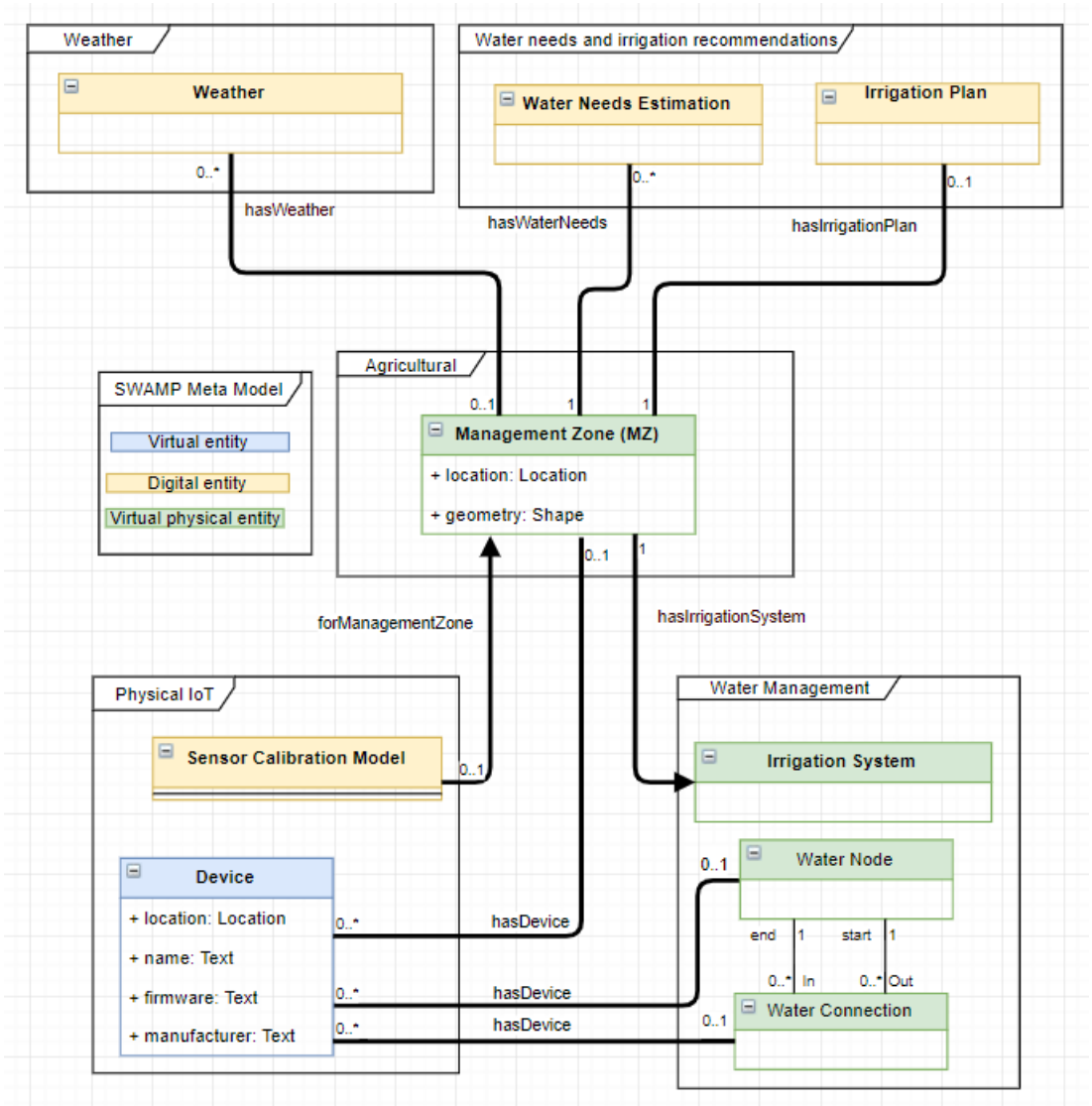
Smart Water Management Platform

SWAMP

SMART WATER MANAGEMENT PLATFORM

- Reducing effort in software development for IoT-based smart applications
- Automating advanced platforms and integrating different technologies and components
- Reliable agronomical models for plants and soils
- Planning algorithms for irrigation
- Automating visual data acquisition employing autonomous drones

SWAMP contribution - model



SMARTBench

SmartBench
Smart Industrial Safety Workbench

- Use for **safety** purposes IoT technologies
- Bring **safety** to industry 4.0 discussion
- Rethink **safety** using all the possibility that new technologies can offer

INAIL
ISTITUTO NAZIONALE PER L'ASSICURAZIONE CONTRO GLI INFORTUNI SUL LAVORO

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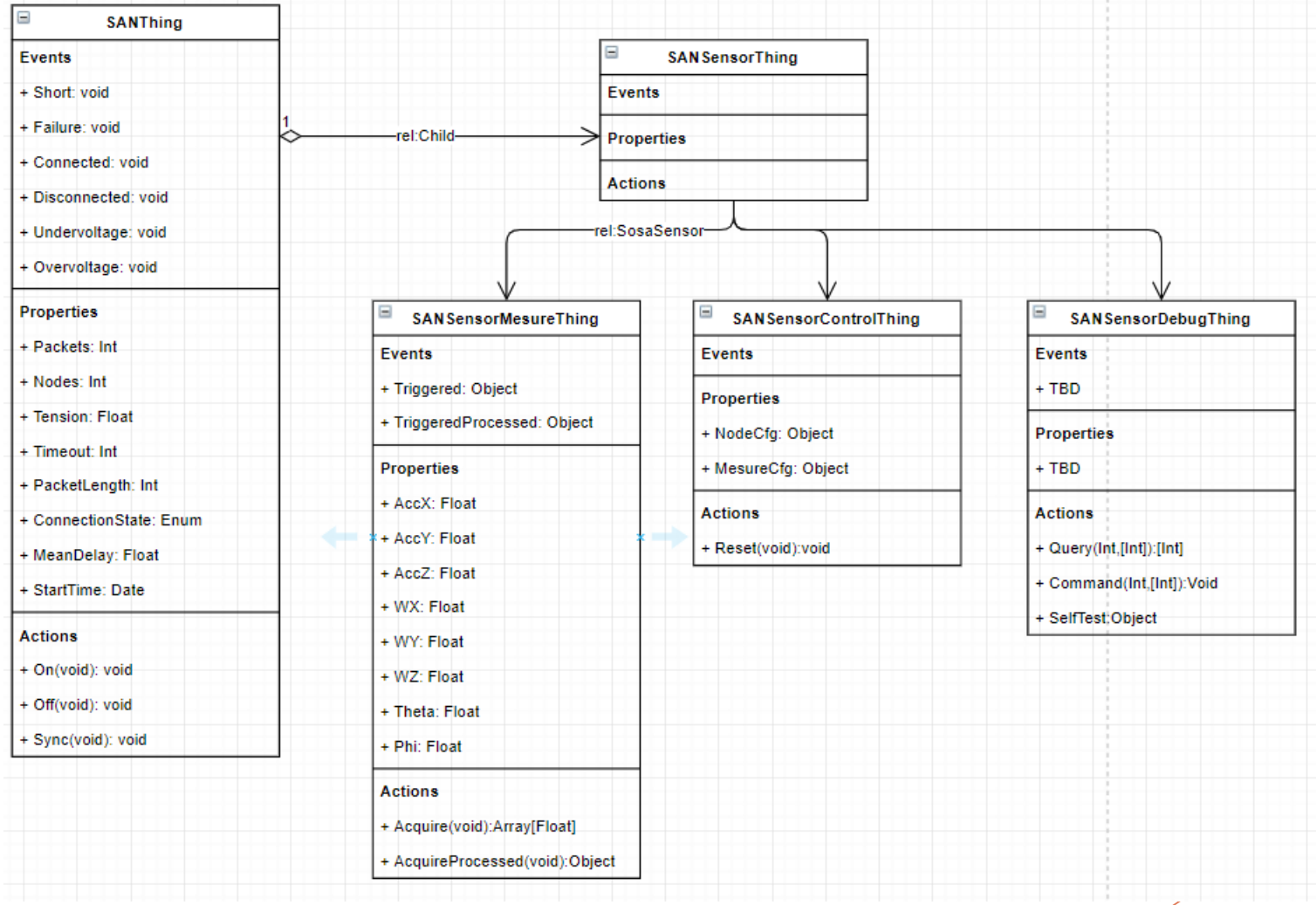
Universitas Studiorum Lupiensis

St. Vdiorvm Vniversitas Messanae

MAC4Pro


SANThing
Events
+ Short: void
+ Failure: void
+ Connected: void
+ Disconnected: void
+ Undervoltage: void
+ Overvoltage: void
Properties
+ Packets: Int
+ Nodes: Int
+ Tension: Float
+ Timeout: Int
+ PacketLength: Int
+ ConnectionState: Enum
+ MeanDelay: Float
+ StartTime: Date
Actions
+ On(void): void
+ Off(void): void
+ Sync(void): void
1
rel:Child
SANSensorThing
Events
Properties
Actions
rel:SosaSensor
SANSensorMesureThing
Events
+ Triggered: Object
+ TriggeredProcessed: Object
Properties
+ AccX: Float
+ AccY: Float
+ AccZ: Float
+ WX: Float
+ WY: Float
+ WZ: Float
+ Theta: Float
+ Phi: Float
Actions
+ Acquire(void):Array[Float]
+ AcquireProcessed(void):Object
SANSensorControlThing
Events
Properties
+ NodeCfg: Object
+ MesureCfg: Object
Actions
+ Reset(void):void
SANSensorDebugThing
Events
+ TBD
Properties
+ TBD
Actions
+ Query(Int,[Int]):[Int]
+ Command(Int,[Int]):Void
+ SelfTest:Object

Some photos from this year


WEB OF
THINGS
Welcome and


WERK 1
CAMPUS AD
Shaping industrial digitalization together
S²
labs
Making
Spaces
Lab
how the Internet works!
Shap
Indus
4.0
Research

Pubblications

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[8] Sciullo, L., Aguzzi, C., Di Felice, M., & Cinotti, T. S. (2019, January). WoT Store: Enabling Things and Applications Discovery for the W3C Web of Things. In 2019 16th IEEE Annual Consumer Communications & Networking Conference (CCNC) (pp. 1-8). IEEE.

Thank you for your attention

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A year of research