IOT-WARE
An Engineering Tool Suite for Enhanced Smart Environments
OUTLINE

SotA in IoT
IoT Development Lifecycle
IoT-Ware!
IoT-Ware & IoT Development
Possible Application Domains
Work in Progress
STATE OF THE ART IN IOT
NUMEROUS COMPETING STANDARDS
STATE OF THE ART IN IOT
WEALTH OF DIFFERENT BUT ISOLATED SYSTEMS

Houses
Buildings
Factories
Ports
Cities
STATE OF THE ART IN IOT

WEALTH OF DIFFERENT BUT ISOLATED SYSTEMS

Little synergies between functions from different application domains

No common system concept for integration across application domains

Extension by additional services (e.g. energy monitoring) is costly
  - Hard to achieve especially for 3rd parties

Integration of the different systems requires high engineering effort

Insufficient diagnosis of the performance of functions
STATE OF THE ART IN IOT
CHALLENGES FOR FUTURE SMART ENVIRONMENTS

A common run-time system allowing flexible extensions by third parties
A common data representation using open standards (e.g. XML, JSON)
**A common communication mechanism based on open standards**
Extensive integration capabilities (e.g. for legacy systems like BACnet)
**Metadata providing comprehensive semantics of data and interfaces**
Open access to data and metadata to support functional extensions
Secure communication interfaces that allow to control access to data

IOT DEVELOPMENT LIFECYCLE

Design

Development

Engineering

Commissioning

Operation

Optimization

All Stakeholders

Domain Engineer

Software Developer

Systems Engineer

System Owner/Operator

Deployment Technician

IOT-WARE

is NOT an IoT device
is NOT a communication protocol
is NOT an IoT system
does NOT aim a specific IoT domain
IOT-WARE

Is a platform & tool suite to produce IoT systems

Addresses each stage of the lifecycle

Targets all stakeholders

Streamlines rapid development

Eliminates SW development knowledge for system engineering

Automatically generates the products
IOT-WARE
TECHNICAL AMBITIONS

To pave the way towards future automations ecosystems by providing the IoT-Ware as technical enabler

- Semantic service framework for enterprise environments
- Easy development & engineering of value-added IoT services
- Simple integration of mainstream IoT technologies
- Semantic models supporting all phases of the service life-cycle
IOT-WARE
DOMAIN MODEL
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DATA TYPE

Blueprint for information representation
IOT-WARE & IOT DEVELOPMENT

FEATURE TYPE

Representation of abilities

Feature Type: Color light emitting

- Name
- Access
- Exposed Value
  - Instance of
- Data Type
- Parameter
- Automation Function
  - Automation Function Domain
  - Automation Function Type
  - Automation Function Context

Readable
Writable
Readable Writable
DATA POINT TYPE

Abstract representation of physical/virtual entities
IOT-WARE & IOT DEVELOPMENT

SERVICE TYPE

Executable representation of physical/virtual entities
IOT-WARE & IOT DEVELOPMENT SYSTEM

Design of an IoT product
Contains
- Service Type (ST) instances
- Relations among the ST instances
- Values of parameters

Generates all the executable system code for
- Commissioning
- Device communication
- User interface
- Monitoring
POSSIBLE APPLICATION DOMAINS

- Building automation
- Industrial applications
- Agriculture
- Medical systems
- Smart cities
- Smart ports
WORK IN PROGRESS

UI/UX for commissioning
Operation and optimization features
Configuration management of entities
Security aspects
WORK MAY BE REQUIRED BY I2PANEMA

A standard communication interface with upper layers
- Semantic Sensor Network Ontology
- Observations and Measurements
- Sensor Model Language (SensorML)
- OGC SensorThings API
- etc.

An integrated method for media streaming
- e.g. Video