
SmartCity Technologies for Cultural Heritage Protection exposed to Climate Change Effects

Jürgen Moßgraber, Tobias Hellmund, Philipp Hertweck, Hylke van der Schaaf

Fraunhofer IOSB, Karlsruhe, Germany

© Authors. All rights reserved

Climate change effects

- Climate change (CC) will morph the environmental landscape
 - climate stress imposed on Cultural Heritage (CH)
- Especially, tangible CH, like
 - castles, palaces, monuments and churches
 - gardens are threatened by CH effects.
- Effects are
 - heat waves,
 - flooding,
 - higher sea level,
 - draughts

SmartCity applications

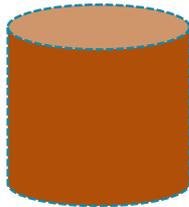
- Smart Energy and Smart Grid
- Smart Buildings
- Water Management (reduction of water losses)
- Public Services
- Lighting (energy efficiency)
- Smart Mobility (reduction of travel time and traffic delays)
- Smart waste Management
- Environmental protection
- Public security
- City services

Commonalities between SmartCity and CH Protection

CH: Apply different kind of sensors to the buildings and gardens to collect data about the weather (temperature, precipitation, etc.), the situation of walls incl. cracks and the state of plants. After that, this data needs to be managed and made accessible in homogeneous way for further processing and analysis.

SmartCity research faces the exact same problems. Sensors are applied all over the city for example about traffic, infrastructure, air and water quality and weather data. In contrast to CH the community is much larger and the industry is involved as well.

Overview and technologies



Sensordata Management
(e.g. SensorThings API)



LoRaWAN (Long Range Wide Area Network)
WiFi, 5G

Sensors



Historic Gardens and buildings

Building
Information
Modeling (BIM)

Open Standard for Sensordata Management

OGC SensorThings API

Standard to manage Sensor- and Metadata



- Sensor-Web-Enablement-Light: SWE for IoT
 - RESTful, JSON, OASIS OData URL Patterns, MQTT

- Fraunhofer Open Source SensorThings API Server

- Open Source(LGPL)

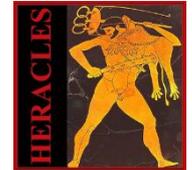
- <https://github.com/FraunhoferIOSB/FROST-Server>



Related Projects

■ HERACLES

- HEritage Resilience Against CLimate Events on Site
- Project in EU Horizon 2020 framework (finished 2019)
- <http://www.heracles-project.eu/>



- »Kulturerbe in Gefahr – Auswirkungen des Klimawandels, Chancen der Digitalisierung« (FALKE II)
 - Fraunhofer project, started 2020
 - <https://www.fraunhofer.de/en/research/current-research/preserving-cultural-heritage.html>