The SensoByg Project seen from a System Architecture Point-of-View

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Outline

The SensoByg Project

Purpose

To develop low-cost, reliable surveillance systems for the construction sector using embedded, wireless sensor technology and intelligent decision support systems.

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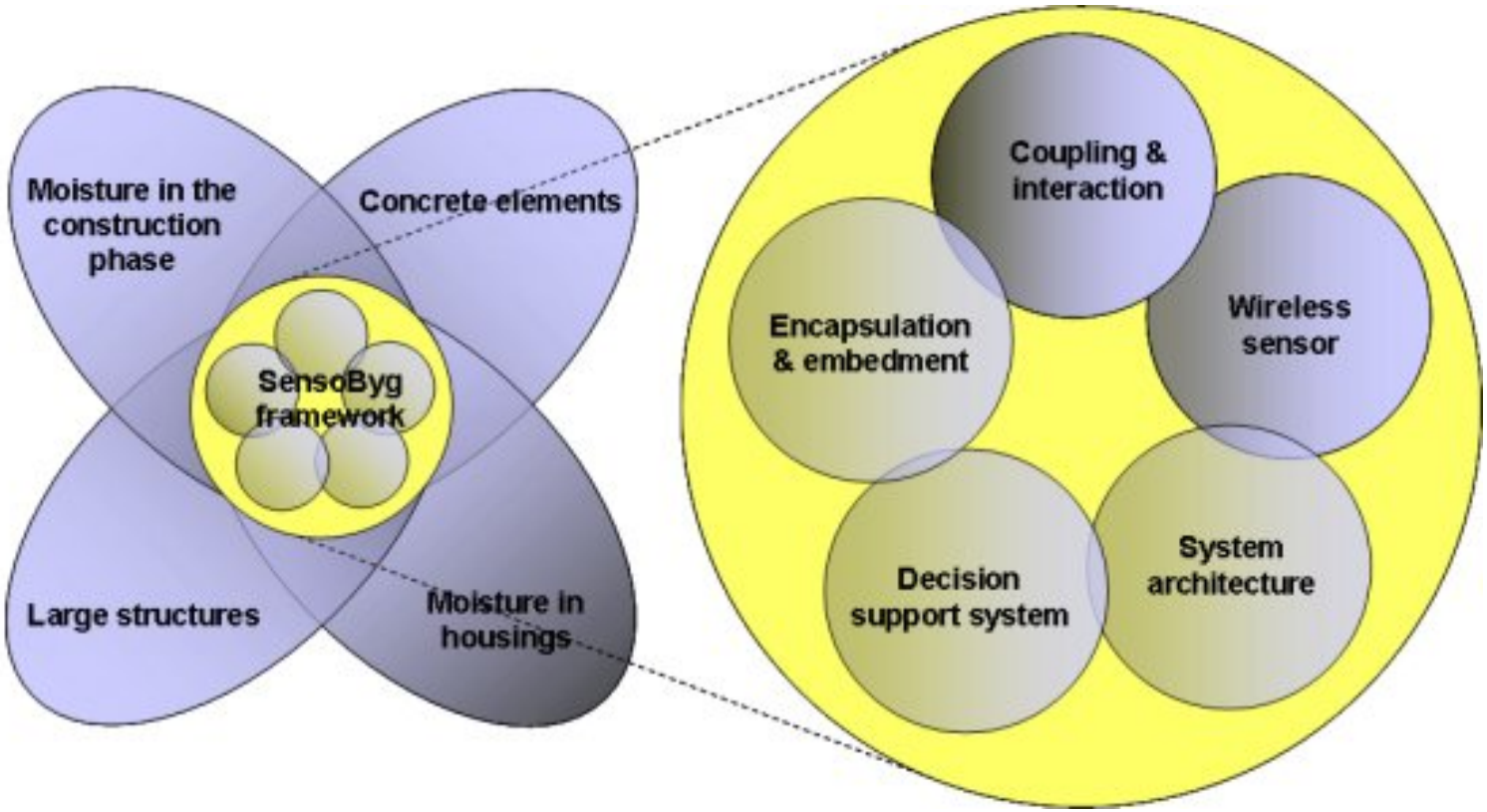
Content

Focus is on surveillance of moisture and temperature in the construction sector via wireless sensors.

Project Structure



F1 - System Architecture

Task

- Develop network/software-architecture for sensor networks.
- Support requirements from the SensoByg scenarios.
- Can scale to general sensor systems for structural health monitoring.

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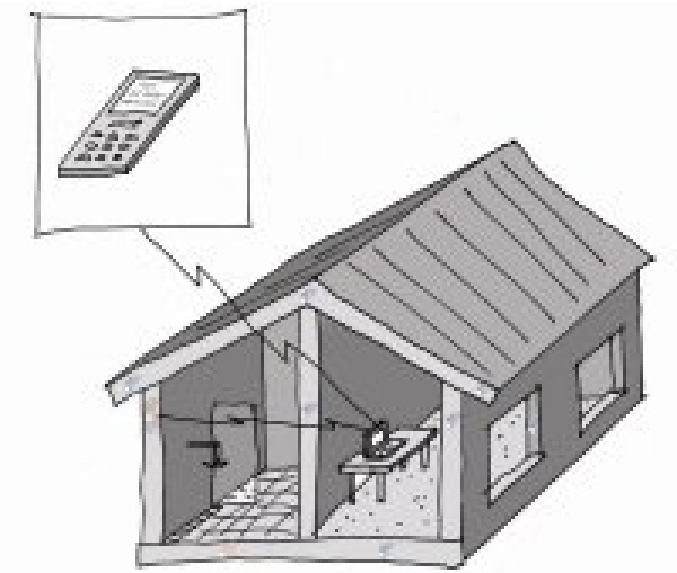
General assumptions

- Sensor units range is less than 10m.
- Active sensor units.
- Battery powered sensor units.
- Sensor units sleep at the same time.

D1 - Moisture in Housings

Purpose

Register moisture content in housings and notify when inappropriate conditions arise, e.g. increased risk of mould and fungi.



Our view-point

Characteristics

- Area of placement is $50 - 100m$.
- One sensor unit per. room ($\approx 20 - 50m^3$)
- Change of power supply possible, so lifetime is in the area of one or two years.
- Frequency of measurements is in the area of 15 minutes.

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Discussion

- Trade-off between multi-hop and number of base stations.
- Sleep is necessary.
- ZigBee supports multi-hop communication.

D2 - Monitoring Large Constructions

Purpose

Using the wireless sensors to establish simple and efficient surveillance of **moisture penetration in large structures** with heavy moisture loads.

Our view-point

Characteristics

- Area of placement is big ($\sim km$).
- Many sensors placed with high density.
- Lifetime in the area of 50 to 100 years.
- Low frequency of measurements.

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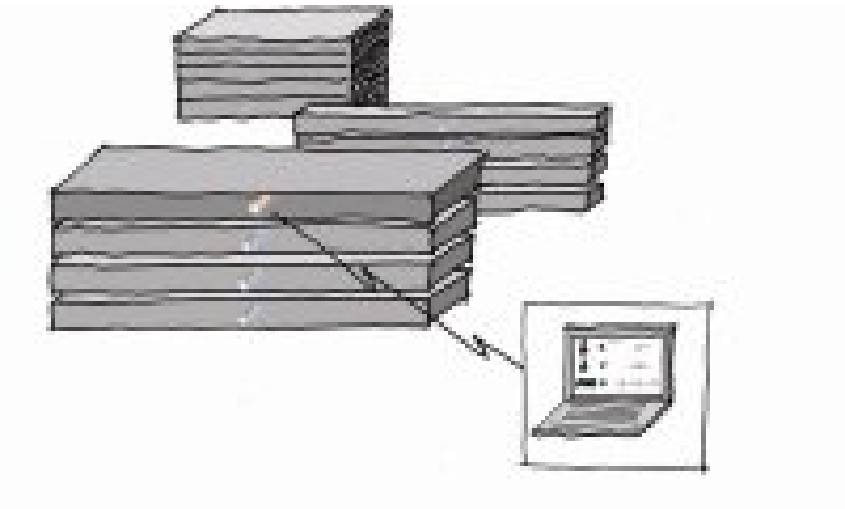
Discussion

- Scalability is important due to large area with high density of sensor units.
- Multi-hop is necessary over long distances.
- Sleep is necessary for energy efficiency.
- The combination of sleep and multi-hop requires synchronization (locally vs. globally).

D3 - Maturity of Concrete Elements

Purpose

To develop a surveillance system based on wireless technology, that is able to **record temperature in concrete elements**, in connection with their production. This should in turn enable determination of maturity of the elements automatically.



Our view-point

Characteristics

- One sensor per. concrete element.
- Density is so far unknown.
- Lifetime is less than two month.
- Reduced range due to placement in concrete.
- Frequency of measurements varies from 15 minutes to one hour.
- Location of elements in stock and in houses are important.

Our view-point

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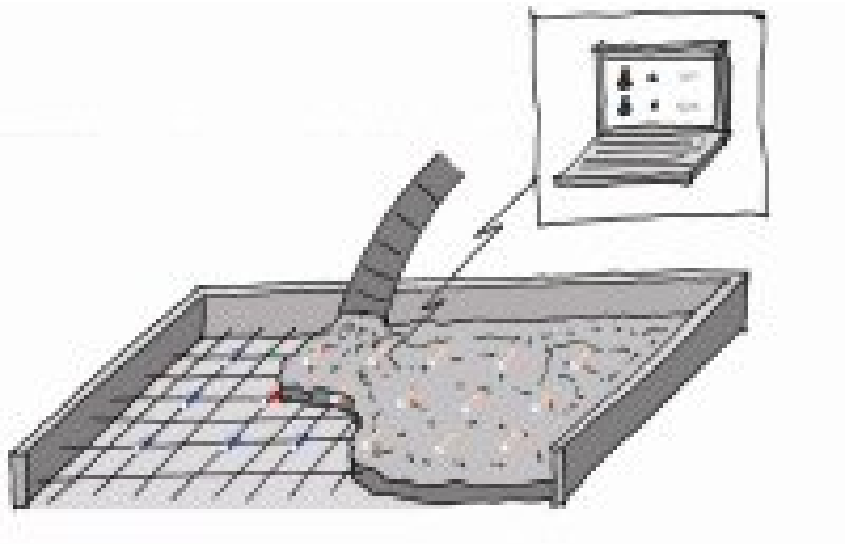
Discussion

- It might not be the sensor units responsibility to be aware of their position (intelligent shelfs and registration of elements position doing placement in housing can do the job).
- Sensor network need to support locationing to be relevant.

D4 - Moisture in the Construction Phase

Purpose

To develop a **surveillance system** based on inexpensive wireless moisture sensors, that can be **used e.g. when casting a concrete floor** as well as subsequent installation.



Our view-point

Characteristics

- Area of placement is $20 - 100m^2$.
- One sensor unit per. m^2.
- Lifetime is less than two month.
- Reduced range due to placement in concrete.
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Discussion

- Multi-hop depends in the ability of a base station to be in one-hop distance to the sensors.

SensoByg in a SHM Context