Planning a Wireless Sensor Network

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AIT, Bangkok

Sebastian Büttrich, NSRC

NSRC
Network Startup Resource Center

Aspects of planning

The big picture
Physical Sensors
Networking options
Powering options
Physical installation, protection
Data transport
Data management
Maintenance
Budget
The actual deployment

The big picture

- **What do you intend to do and why?**
- **What are your goals and outcomes?**

Physical sensor

- Choosing the right type
- size
- price
-

Calibration

- initial
- re-calibration? How often?

Networking options

- Wired (ethernet, fiber)
- Wireless
  - 802.15.4, zigbee
  - 802.11 WiFi
  - GSM/GPRS
  - satellite
  - Bluetooth
  - Frequency choice

Wireless networking: Frequency aspects

- higher frequency, higher data rate
- higher frequency, shorter reach
- lower frequency, better penetration (through objects, environment)

Site survey

- Interference, coexistence?
- Conditions that change over time? Seasons? Traffic?

Powering options

- Dependent or autonomous?
- Autonomous options
  - Battery only
  - Solar
  - Wind
  - Hydro
  - Thermal, vibrational energy harvesting
  - (Wireless power transfer)

Physical installation, protection

- Environmental protection
  - Weather
    - Lightning
    - Wind
    - Humidity
    - Fires
- Animals?
- Social aspects, human factors
  - theft? Vandalism
  - cleaning personnel :)

Data transport

- From sensor to database, archive, lab
- How often?
- Protocol
- Security aspects
- Delays, failure, failover

Data management

- Where does the data go?
- Database design, format, organization of data
- Backup
- Access, dissemination, openness?
- Visualization
- Security, data integrity
- Imagine a scenario where data are manipulated - e.g. early disaster warning systems, radiation

Maintenance

- Long term maintenance & support
- Hardware replacement plan
- Physical distance from “civilization” to deployment location
- Unattended restart, recovery
- Human factors

Budget

… :)

The actual deployment

Communications: How do lab and field teams communicate during the actual deployment?

Transport: Getting there and back

What to take: we typically forget essentials like umbrellas, water, charged batteries, ...

Conclusion: my personal

Top 3 of things that go wrong in WSN

1. Power

2. Not having a maintenance / operations plan -

including people, budgets, travels, ...

3. Now you have data ...

but you don't know what to do with them