COMMUNITY SENSOR NETWORKING FOR CLIMATE PREDICTION

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Some of the main challenges

- Traditional challenges
  - Poverty Alleviation
  - Digital Divide
  - Scientific Divide
  - Many others such as health, water quality, etc..
- Emerging challenges
  - Climate change
  - Pollution monitoring
  - Drought monitoring
  - Typhoons, landslides, hurricanes, and many other environmental challenges to be added to the list above.

Traditional climate prediction

- Climate prediction is traditionally performed using fixed monitoring stations installed only in a number of fixed locations.
- Though being highly sensitive and well calibrated these stations raise challenges
  - Equipment cost
  - Self-sustainability
  - Capacity building
  - Technological Expertise

The role of sensor Networking

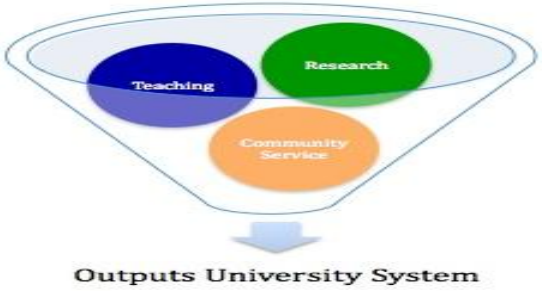
- Bridge the visibility gap: by promoting public participation to take advantage of the work of data collected from private personal observations of hundreds, or even thousands, of individuals.

Sensor network deployment

Embedding-and-networking to provide services to different applications

Climate prediction: the role of Academia

- Role of Academia:



- Research and Teaching:
  - Sensing technologies.
  - Networking technologies.
  - Data mining.
- Community Services:
  - Regulation
  - Training
  - Awareness

Implementation model

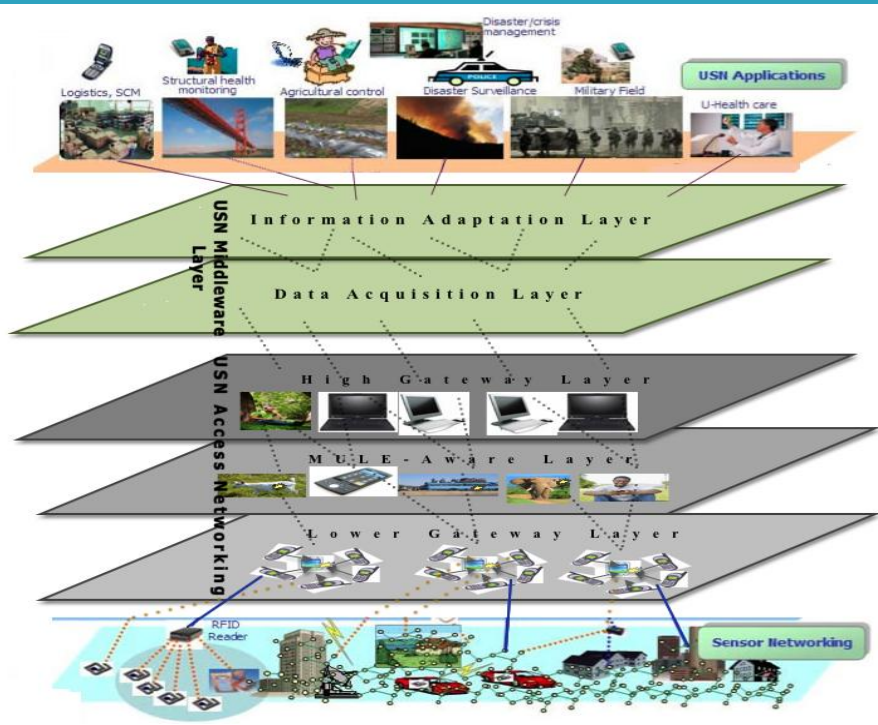
How the academia can help

- Community Service:
  - To act as a think tank supporting
    - Government sector
    - Municipalities
    - Civil society
    - Entrepreneurs
  - Development cooperation
  - Incubation
  - Targeted Capacity Building

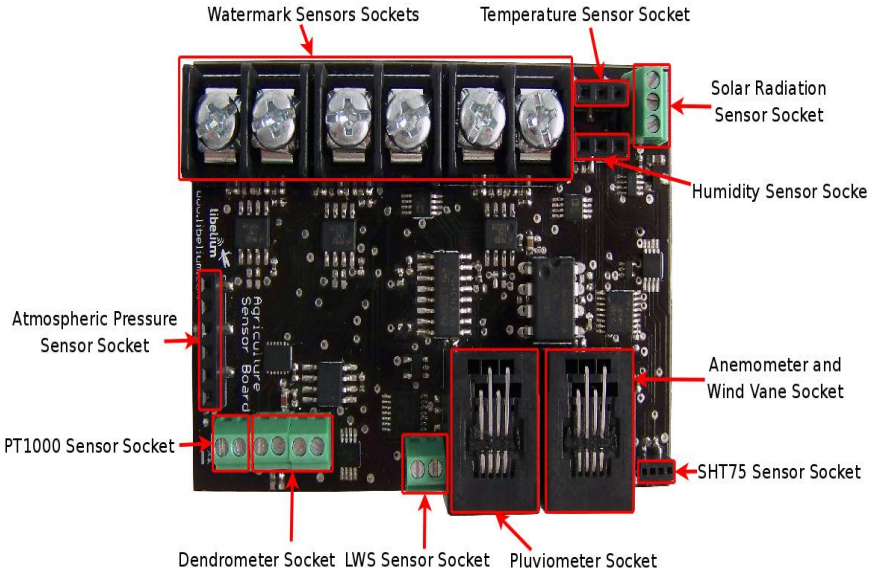
Community sensor networking framework

A multi-layered, multi-technology framework building upon

- Sensor, GPS and RFID Technologies
  - Sensing the environment using sensors
  - Localization of objects and data using GPS
  - Identifying objects using RFID technology
- Mobile Technology to achieve
  - Real-time information dissemination
  - Opportunistic information dissemination
  - Mobile Grid Data Processing
- Service Oriented Technology
  - Grid-based storage/processing
  - Middleware intelligence
  - Middleware content adaptation



Using least-cost weather devices



Preliminary achievements

Preliminary achievements

- Research:
  - Technology observation: testing sensor, GPS, and mobile technology mostly in terms of readiness for field deployment for environmental issues.
  - Testbed Experimentation on Sensor Technology: sensor calibration work with KMD.
  - Publications in conferences and journals and research collaboration with ICTP, University of Nairobi, ITU, Polytechnic of Malawi, etc.

Preliminary achievements

- Teaching:
  - First African Workshop on WSN organized at the university of Cape Town in March 2010.
  - Second African Workshop on WSN organized at the university of Nairobi in Kenya in May/June 2010.
  - Third African Workshop on WSN to be held at the university of Ghana in December 2011.
  - Working on a Training Kit: book, slide + training equipment on a practical approach to training wireless sensor networking. " to be released in December 2011.

Actions Steps

Research

- ❑ Develop a set of environmental problems to be solved by students and/or researchers from across the continent as part of their research projects.
- ❑With the help of donor institutions, extend Technology observation activities to other institutions in South Africa and the continent.

Teaching

- ❑ With the help of Unesco/ITU, design a curriculum in environment monitoring issues and work on training kits on environment monitoring that include
  - ✓An open source training manual (book)
  - ✓Slides supporting the training manual
  - ✓Example Software accompanying the manual
  - ✓Sensor/gateway equipment for experimentation
- ❑Organize events that will help orient and mentor students in undertaking quality research in environment monitoring. This will be implemented in terms of workshops focusing on awareness, research and deployment. We plan 5 workshops from 2012 to 2016

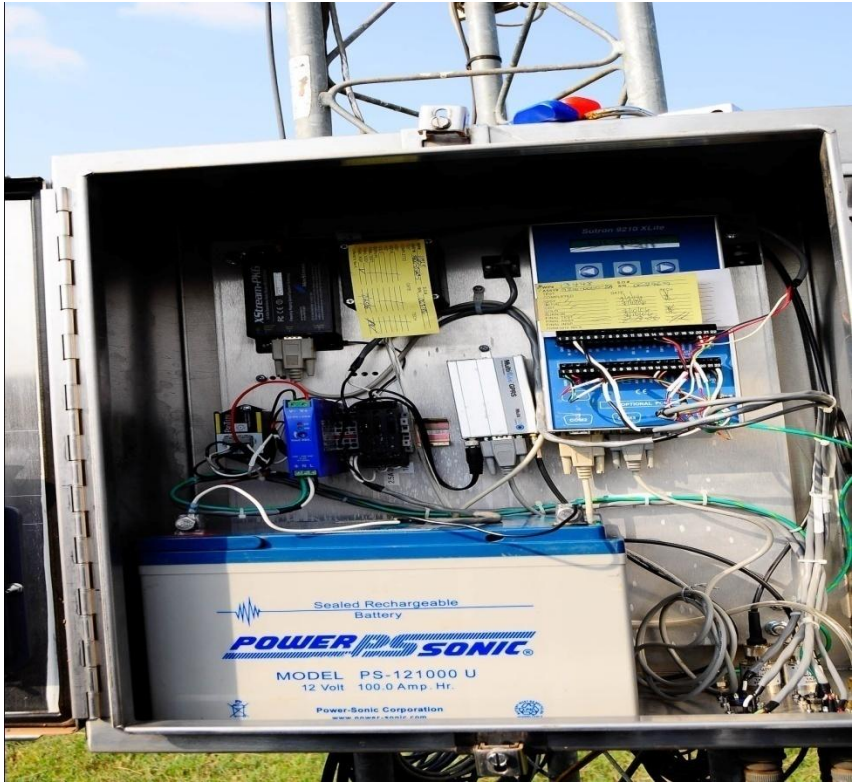
Actions Steps

Community Services

- Environment monitoring in cities: we have started some contacts with Shawco, a UCT NGO to mount sensors on their buses in order to collect environmental data in the city. This will provide a pilot mobile sensor network upon that will be used as proof of concept for the city of Cape Town and other cities.
- Regulation and policies: We are planning collaboration with regulators and policy makers in order to involve the academia.

A Workshop in Kenya

A Workshop in Kenya



A Workshop in Kenya

Conclusion

- Building around the main issues associated with traditional weather monitoring, we have looked at different ways of involving the research community in the fight against climate change.
- Some action plans are proposed but they need cooperation and strong willingness to be executed.