A Multifunctional Sensor Network Node, Field Server and Its Seamless Integration with Legacy Observations

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K. Honda Asian Institute of Technology, Thailand Wi-Fi Mesh or Wi-Fi WDS network
Web Server
Sensors (up to 24ch)
Camera (0.3-8M Pixels)
LED Lighting
Solar-cell

Standard commercial model

Field Server

- 4 Sensors
 - Temperature
 - Humidity
 - Solar radiation
 - Soil temperature
- 0.3 M pixel web camera
- WDS Wireless LAN
 - US\$2,000

Components of the Field Server



1. Accurate measurement

Assmann's aspiration psychrometer

- Air-temperature
- Humidity
- Solar radiation
- 2. Cooling mechanism
- 3. Modularized architecture
 - Flexible extensibility
- 4. Other sensors
 - Gas (CO₂, NOx, SOx)
 - Rain gauge
 - Electric Capacitance
 - Dust,....



Precision is as good as much as much more expensive standard weather robot





Several Long Term Test Beds

• Target area is expanding from agricultural monitoring to environmental monitoring and security watch







Fan was broken by powdery sand in Ocher Plateau



Circuit was broken by gecko in a Hawaii site



Circuit was corroded by dew drops in Hebei dry land



The first trial in Himalaya was failed



Imja Glacier Lake, near Mt. Everest, 5200 m





Secured data collection by Agent Box

- Small PC with Field Server Agent, Data-Viewer, Web Server, Data-storage
- Automatically collect data locally when the Internet is not available or unstable



Other connectivity



NARC

NARO

CDMA (mobile phone) router in China

Data View and Download Service





Image-Viewer







Multiple Image View Service



Event Detection Service



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MetBroker

- Middleware to provide consistent access to heterogeneous weather databases
- It covers 22,000 weather stations of 25 DBs

 Legacy weather databases and sensor network nodes are seamlessly integrated

INC. 2012157411 N. 1013702521 E.









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Seamless integration of Field Server with legacy databases through MetBroker SOAP Web Service



Spatial Access by MetBroker

Data request by longitude-latitude box



Spatial Integration of Sensor Network and Legacy Observation











We are now developing..

Sensor Plug & Play

- Automatic Configuration
- Establishing Data Path
- Archiving
- Data Publishing

OGC Standard SOS (Sensor Observation Service)

- FS + Linux BOX (SOS)
- SOS MetBroker Interface



- New MetBroker based on Web Ontology
 - A proto type is ready
 - Follow WMO XML recommendation



Thank you for your attention

- Field Server: http://model.job.affrc.go.jp/ FieldServer/
- MetBroker: http://www.agmodel.org/
- Commercial version available from eLab Experience Ltd: http://elab-experience.com





Glocally Executable Crop Model

- Prediction of Rice Yields
- Parameters for several rice varieties are available





Rice Yield Prediction Service















It can run anywhere in the world if weather is available

