UCLA
Posters

Title
Multisensor Module for Networked Infomechanical Systems

Permalink
https://escholarship.org/uc/item/65t5476p

Authors
Jason Gordon
Kris Porter
Lisa Shirachi
et al.

Publication Date
2005

MultiSensor Module for Networked Infomechanical Systems (NIMS)

Jason Gordon, Kris Porter, Lisa Shirachi, Rachel Scollans, Victor Chen, William J. Kaiser

University of California, Los Angeles - NIMS

Introduction: NIMS – A New Sensor Architecture

Mobile Environmental Sensing

- The ability to *remotely monitor* the dynamics of a natural environment is an increasingly important avenue for investigating and ultimately protecting natural ecosystems and safeguarding public health. NIMS provides a new capability for mobile monitoring of complex environments. NIMS enables the first spatiotemporally resolved sensing capability for applications including microclimate characterization in the forest canopy.

NIMS Sensing Architecture

- The NIMS sensing architecture includes sensors supported on multiple mobile and static infrastructure elements. This includes sensors supported on a horizontal NIMS transport that glides above the surroundings on steel cables attached to fixed surfaces (trees, buildings, etc.) Also, this node communicates with stationary sensors supported on cables within the target environment. Finally, a vertically articulated mobile node probes the environment in the transect below the horizontal node.

Problem Description: Data Acquisition, Processing, Storage, and Transport

High Precision Microclimate Sensing

In this application of mobile and stationary sensing devices, high precision microclimate sensors are critical for characterizing the field variables of temperature, relative humidity, and solar radiation intensity. The vertically articulated mobile embedded node must sample sensor systems, monitor for obstacles with proximity sensors and communicate measurements to the NIMS horizontal node.

Cable Infrastructure

Embedded Payload

Articulated Image Sensor
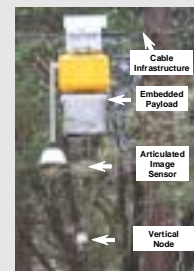
Vertical Node

Proposed Solution: Vertical Node Module

MultiSensor Module

- This vertically articulated MultiSensor module is lowered from the NIMS node to distances of up to 200 ft.

- This module aggregates temperature, humidity, and light intensity data.

- An ultrasonic active position sensor provides obstacle detection capability

- Analog data is acquired from high precision sensors.

- An embedded Intel Stargate™ platform provides support for data acquisition and sensor signal processing

- Wireless networking includes IEEE 802.11 network links between the MultiSensor module and the horizontal transport. Wireless networks links also include interfaces to distributed mote networks.

- Energy for MultiSensor node operation is supplied via power carried in the suspension cable.

Electronic components and environmentally sealed package

Ultrasonic Position Sensor

Photosynthetically Active Radiation Sensor

View of complete MultiSensor Module

Relative Humidity and Temperature Sensor Probe