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Title

ACT5: Networked Infomechanical Systems

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2005

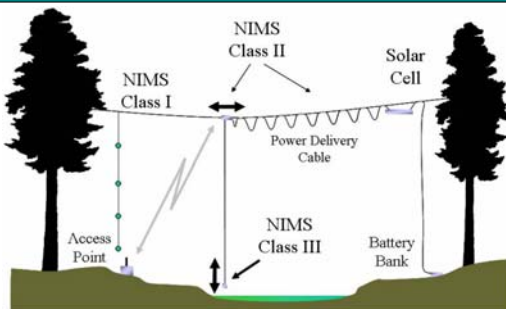
Networked Infomechanical Systems: A Mobile Embedded Networked Sensor Platform

Richard Pon, Maxim A. Batalin, Jason Gordon, Aman Kansal, Duo Liu, Mohammad Rahimi, Lisa Shirachi, Yan Yu, Mark Hansen, William J. Kaiser, Mani Srivastava, Gaurav Sukhatme, Deborah Estrin
<http://www.cens.ucla.edu/portal/nims/>

Overview

Infrastructure-Enabled Actuated Sensing

- Adaptation to dynamics
- Sustainable monitoring
- Precise motion
- Sensing diversity
- 3D environment access



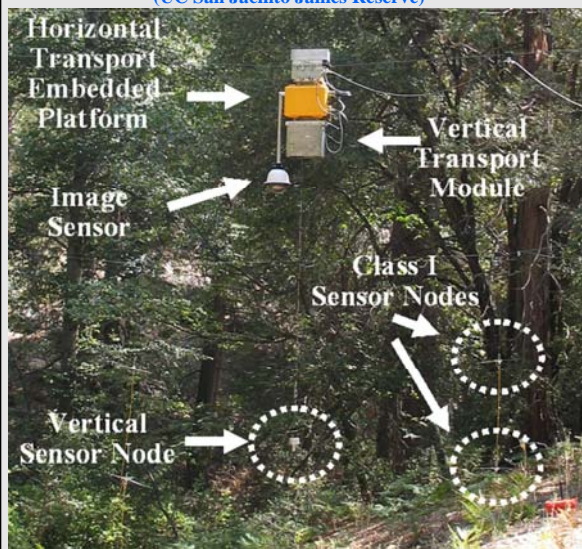
NIMS Architecture

- Hierarchy of static and mobile nodes and infrastructure
- Diversity of node and sensor type
- Energy harvesting and distribution
- Low energy deterministic mobility
- Rapidly deployable
- Wireless network
- Local and remote management

NIMS Systems and Data

NIMS Field Systems

Ecosystem Monitoring
(UC San Jacinto James Reserve)

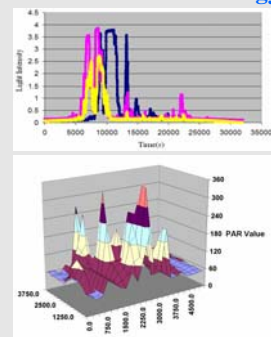


NIMS RD (Rapidly Deployable)

Water System Sensing and Sampling
(Medea Creek, Santa Monica Mountains)



Spatiotemporally Resolved Microclimate and Energy



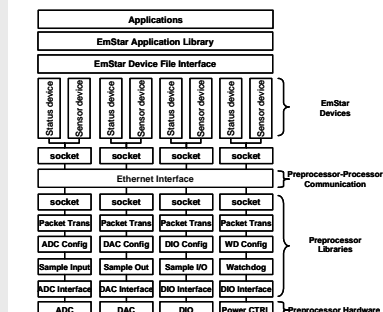
Imaging Phenology: Direct Growth Tracking



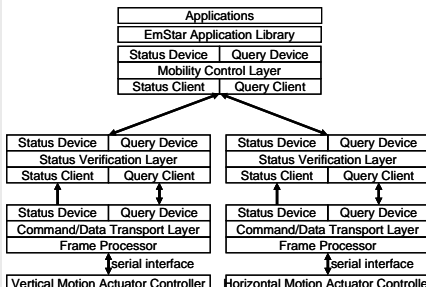
NIMS Architecture

Processor-Preprocessor

- Processor supports signal and image processing, adaptive sampling, task allocation, and statistical computing.
- Preprocessor supports diverse sensing, actuation, energy control interfaces



Emstar Runtime Environment



- Modular drivers for actuators and preprocessor accessible sensors
- Common interfaces for static and mobile laboratory and field systems
- Enables hardware-in-the-loop actuator emulation for system testing and algorithm verification

In-Network Statistical Computing

- Statistical computing tools required for adaptive sampling
- R language environment hosted on NIMS field and laboratory emulation platforms
- Field estimation and error detection drive sensor actuation to for on-line optimization of sensing fidelity

