

DATA 07 CENS Research Testbeds

CENS maintains a number of testbeds to enable and encourage various degrees of “in lab” to “real world” deployments using a spectrum of sensor network components, ranging from sensor hardware to network protocols. Our stationary testbeds include both indoor and outdoor deployments; outdoor usage is primarily in terrestrial settings, both above- and below-ground and is typically in medium- to-dense foliage environments. Our largest stationary testbed is currently deployed in the Andes. These stationary testbeds are augmented by a portable sensor platform that has been used in locations ranging from sea level to 15,000 feet in California and Central America and mobile device-based testbeds with over 500 devices to support urban and participatory sensing.

CENS Mobile Personal Sensing Testbed

With over 500 mobile devices, the CENS Mobile Personal Sensing Testbed supports several simultaneous real world pilot tests. The devices include nearly 500 mobile smart phones from Nokia, Samsung, and other manufacturers, running Symbian, Windows, and Android operating systems. In addition, a pool of 75 bluetooth GPS units can interface to mobile phones, and 20 GPS loggers can be used as standalone data collection devices. CENS maintains a variable number of cellular voice and data service plans as part of the testbed. Contact: Betta Dawson (betta@cens.ucla.edu).

CENS Central CA River Testbed

Based along a well-characterized reach of the Merced River at a USGS research site, the CENS river testbed includes shallow and deep (to 50 m) groundwater wells along a 1 km flow path from orchards, through row crops and a riparian zone to the Merced River. This testbed can be used in conjunction with the NIMS testbed (see below) to establish a system capable of characterizing both the river and the groundwater inputs and sinks. Contact: Tom Harmon (tharmon@ucmerced.edu).

CENS USC Coastal Robotic and Buoy Testbed

The NAMOS team at USC maintains a coastal monitoring testbed comprising static buoys and robotic boats. The buoys monitor the physical and chemical parameters of the water and communicate with the boat which can navigate according to the conditions observed by the buoys. In addition, the group uses two Slocum underwater gliders in coastal waters to monitor and communicate conditions that give rise to harmful algal blooms. Contact: Garuav Sukhatme (gaurav@usc.edu).

UC James Reserve Cyclops testbed

The 29-acre UC James Reserve, located about three hours from UCLA in the San Jacinto Mountains near Palm Springs, hosts several testbeds. The CENS Cyclops team has designed and deployed 25 imaging and environmental nodes to monitor active nest boxes spread around the James Reserve. These CENS-developed nodes—a synergistic combination of Cyclops boards and Crossbow motes—record images and data every 8 to 10 minutes around the clock during the nesting season and incorporate CENS-designed software protocols. Contact: John Hicks (jhicks@cens.ucla.edu).

UC James Reserve AMARRS testbed

Underground soil sensing at JR incorporates a set of COTS data loggers augmented by motes that produce real-time data streams to aid in monitoring both sensor health and real-time data analysis. This novel hybrid approach also leverages the ESS software. Contact: John Hicks (jhicks@cens.ucla.edu).

UC James Reserve NIMS testbed

The Networked Info-Mechanical Systems project has constructed a cable-based testbed at JR: NIMS-1 is a 35m transect spanning a creek bed and adjacent hillsides, with a controllable robot hosting a range of sensors (micro-climate, imaging, etc.). Contact: Eric Graham (egraham@cens.ucla.edu).

NIMS-RD portable testbed

A NIMS platform specifically designed for “rapid deployments” (in contrast to the permanent testbed installation at James Reserve) has been used in a remarkable variety of settings, measuring both terrestrial and aquatic phenomena. The NIMS-RD testbed has visited the 15,000 foot White Mountains of California to study plant growth and solar radiation effects, has been deployed many times on the Merced and San Joaquin rivers to study confluence patterns of aquatic contaminants, has been taken to the La Selva Reserve in Costa Rica to examine plant growth at the edge of the tropical forest, has been deployed across Lake Fulmor (a small lake adjacent to the James Reserve), and in Argentina to study lake contaminants. Contact: Bill Kaiser (kaiser@ee.ucla.edu).

CENS seismic testbed

This testbed is composed of 50 solar-powered wireless seismic nodes plus 15 wireless repeater stations, and is currently deployed in southern Peru where it spans the Andes with an ad hoc WiFi network. The testbed serves as a platform for experimentation with disruption tolerant network protocols while collecting seismic data studied in collaboration between the UCLA Earth and Space Sciences department and the CalTech Tectonic Observatory. It is relocated every 2-3 years: from 2005-2007 it was deployed in central Mexico; in 2008 it was moved to Peru; one half of the current transect will be relocated about 200 miles north in mid 2010. Contact: Richard Guy (rguy@cens.ucla.edu).