End-User Interface and Backend for Wireless Networks

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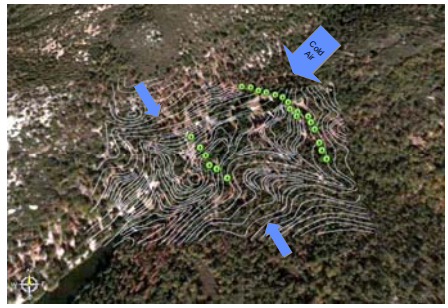
Goals:

Creation of a Backend

Users of wireless networks need to make use of a variety of different network designs and sensor types. We want to provide a robust database backend that can meet those needs. A stable, cross-application backend will give the user access to a variety of existing tools and simplify the process of creating new tools.

Creation of a Frontend

Because networked transects will be deployed by ecologists and biologists with little technical knowledge of such networks it is critical to provide them with a simple and intuitive interface for them to interact with the transect and its data.



Issues Encountered in the James Reserve Deployment:

Making deployment issues transparent to the user:

- Non-synchronized timestamps – Offsets calculated by comparison to existing fixed sensors.
- Battery failures – Process and recognize voltage trends that precede a failure.
- Incorrect mote configuration – Rapid recognition of software errors is needed.
- Sensor / mote failure – Consistent out-of-bounds data readings flagged.

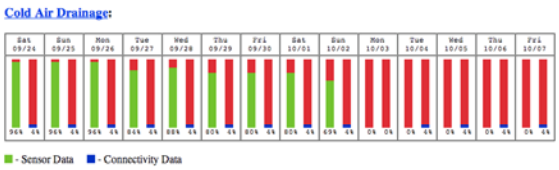
Solutions:

Moving Data Into Backend

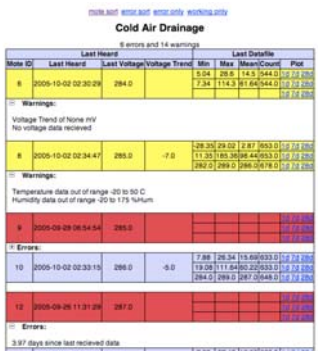
Data is periodically downloaded and processed before loading into the database backend. Simple filtering and processing of the data is extremely useful as it can provide the end user with important information about the status of the network.

Web-based Frontend

Significant time is required to maintain a deployed transect in working order. Simple intuitive interfaces allow non-technical users to easily assess the health of a transect.



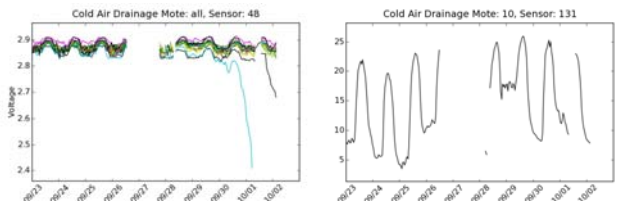
Historical view of data received and processed for a specific transect.



Current state of the transect over the last 24-hr period. Provides basic sanity checking of data to identify current and potential future transect issues.

Web-Based Visualization

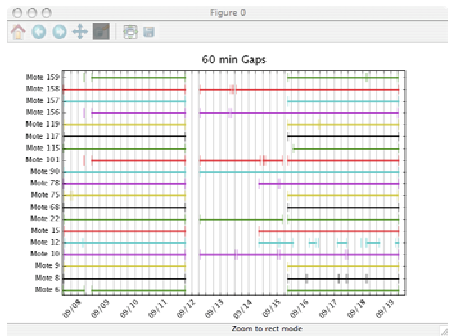
The end user must also be able to easily visualize historic data from the transect. The web interface includes a robust but simple plotting interface for all current sensor data types.



Sample plots that show several basic features of the plotting interface

Working with the Data

The backend is designed with ease of access in mind. This allows users to export data easily into standard formats to use with other applications. Applications can also be created to directly interface with the database to ask specific questions.



Example application that directly interfaces with the database to examine data continuity based on a user-defined maximum gap size.