Productive Programming for Situational Awareness and Response
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Goal: Research on improving programming productivity for sensing and sense/react systems.

- Productivity = Net present value of output.
  - Efficient design and deployment
  - Timely delivery of the right results.
- QoS/Relevance constraints.

Driving Problems: Environmental Sense/React. Rapidly deployable, Robust, Real-time Situational Awareness and Response (R³SAR Systems).

- Response to environmental emergencies: fire, flood, wind, …
- DHS and DoD problems.
- Cost-effective sensing for field sciences.

General Approach: Explore/extend successful data-oriented, high-productivity methods.

- Spreadsheet (Table) idiom.
- Map/Reduce → Sense/Reduce
- Databases and extensions.
- (Scripting languages.)

Specific Activities:

- Experimental platforms:TelosB and Sunspots, embedded (MAEMO, Android, …) devices.
- Software prototyping and experimentation.
  - Sense/reduce prototype.
  - Campus WiFi base station signal strength capture
  - Control interface for "Tables" on Android phone.
  - Bird feeder monitoring.
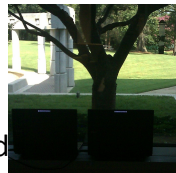
A Motivating Example: Flood Sensing in estuaries sensitive to storm surges (2007-2009)

RENCI and Brunswick County EMS.
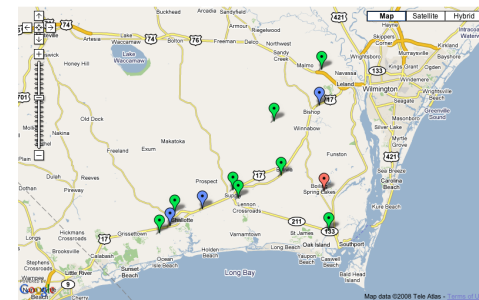
- Internet base stations (PC104/Linux) connected to EMS with failover using wired service, cellular modems, AV.25 on trunked EMS radio.
- Results distributed via (Mobile) Web.
- Base-station to sensor node (SunSpot) connectivity via wire, Bluetooth, Zigbee.
- Sensors: flood level, robust weather stations.
- Ample battery capacity with PV chargers.