Programming in Proto

Proto is a stream processing language based on the amorphous medium abstraction. Our implementation supports over-the-air programming of Mica2 Motes.

Composition Abstraction

Basics Primitives

Special Operations

Communication

Space Restriction

State

Energy Management

Many existing energy management techniques can be confined to one side of the abstraction barrier.

Space-Centric

Local Communication

Examples: Energy Aware Routing, Directed Diffusion

Examples: S-MAC, TDMA

What is an Amorphous Medium?

Many sensor-network applications care less about the network than the properties of the space it occupies. An amorphous medium program controls space explicitly, and is approximated by implicit network activity.

The medium is a compact manifold with a device at every point. Devices can read time-lagged state from nearby neighbors.

100 nodes

1,000 nodes

10,000 nodes

For more information on Proto, see Infrastructure for Engineered Emergence on Sensor/Actuator Networks, Jacob Beal and Jonathan Bachrach, IEEE Intelligent Systems, (Vol. 21, No. 2) pp. 10-19, March/April 2006.