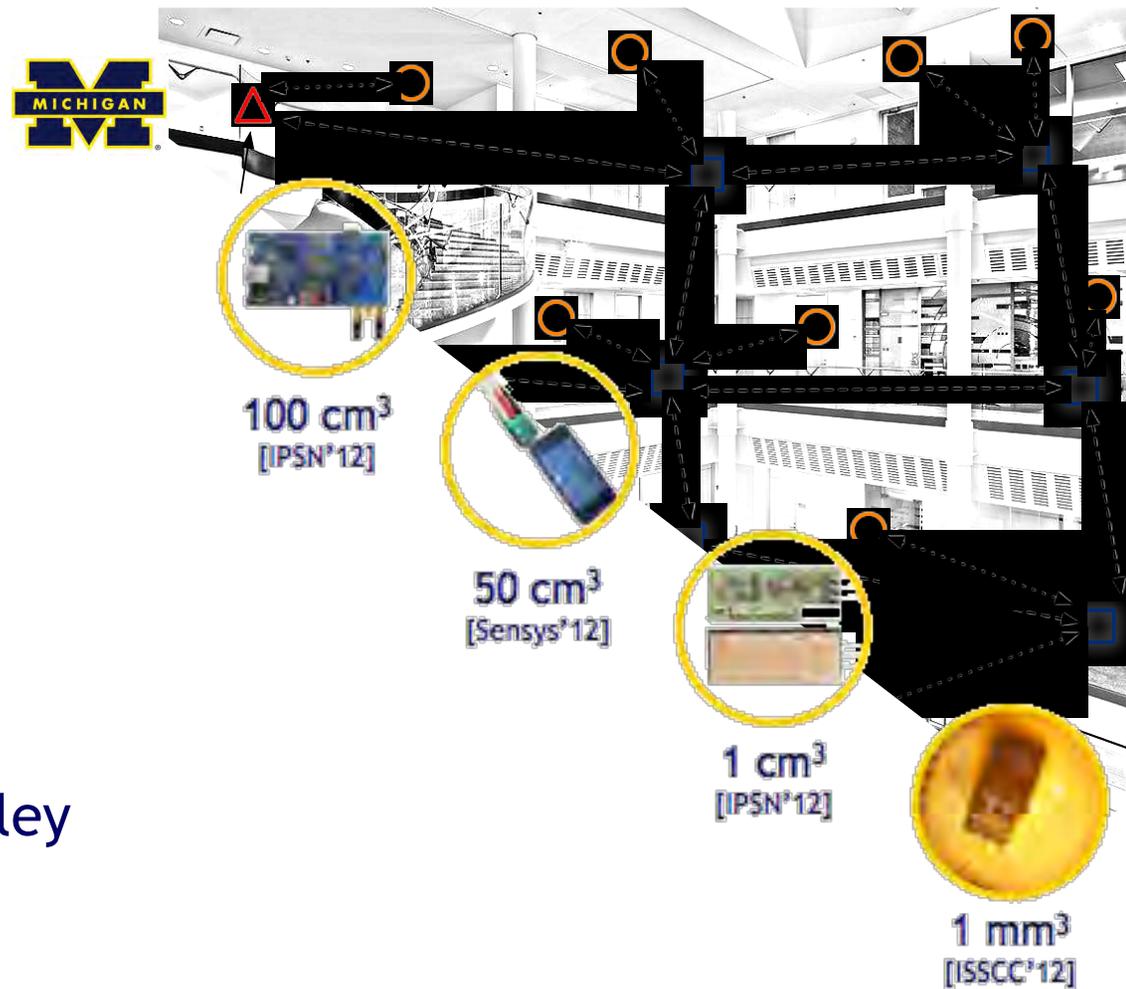




Elements of a Sensor Toolkit for Development Engineering

Prabal Dutta
University of Michigan



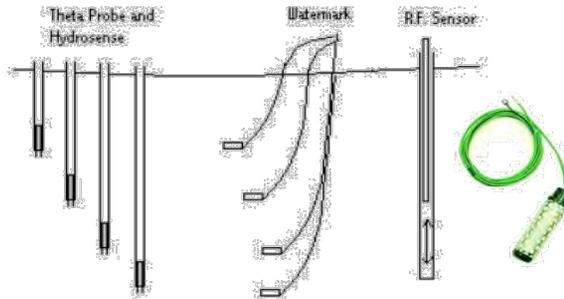
DIL Launch @ UC Berkeley
Friday, March 1, 2013

Connect mobile phones to environmental sensors



- Soil moisture sensing for agriculture

- Sensors cost <\$10
- Readers cost \$300
- Low volumes, poor dist.
- Out of the reach of most
- Immensely helpful for yield



- From *Doctors without Borders* to “doctors beyond borders”

- Enabled by turning mobile phones into medical instruments
- Leverage same technology for inexpensive
 - EKG, EEG, BP, PulseOx, ... sensors
- Share data with doctor next door or around the world, or FB friends



- Mobile radiation dosimeter

- Allow phones to take spot samples
- Log locally or upload to cloud
- Leave behind and sample remotely



or

+



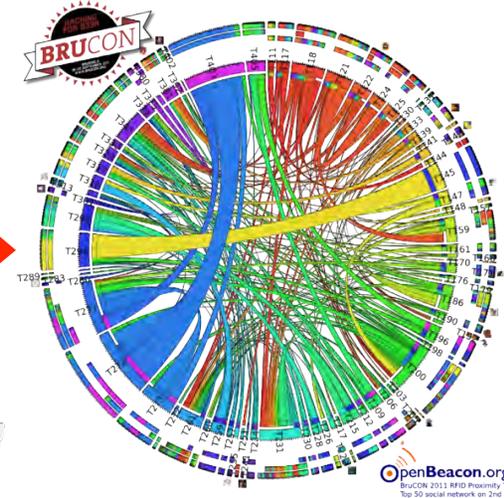
Capture the *real* social network



Michigan's *Opo* Sensor

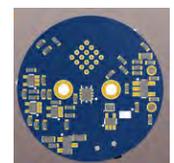
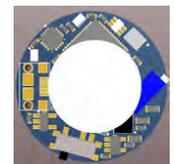


40 mAh Li+ battery
www.sparkfun.com/products/11316



<http://www.openbeacon.org/>

- Matchbox-sized sensors that range peers; mounts in a shirt-button hole
- Capture & log face-to-face interactions with others wearing them
- Capture & log proximity with places and things that have them
- Detects neighbors in less than one second of spatial proximity
- Store logs locally and upload wirelessly and opportunistically
- Can run for a week with typical interactions between people
- Next-gen sensors to be < 1" diameter, like a lapel pin clutch



Collect air quality data

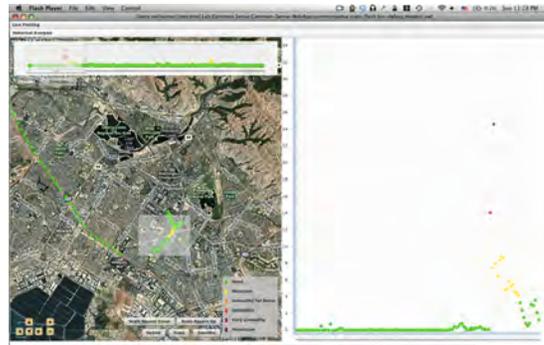


Periodic Stationary



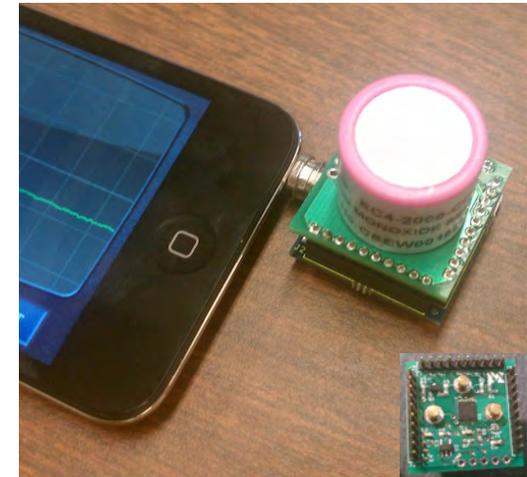
- Stationary AQ sensor
- CO, NO₂, O₃, SO₂
- Temp, Humidity
- Locally log data
- Retrieve/download

Periodic Mobile



- Portable sensing
- CO, NO_x, O₃, T/H
- Time, Location
- GPRS, GPS, BT, ZB
- Report to cloud

Sporadic Mobile



- Phones → monitors
- Monitor gas conc.
- Phone gives power
- Phone give network
- Wide coverage
- Report to cloud

Characterize and control the built environment

