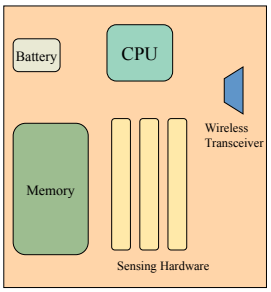
Wireless Sensor Network

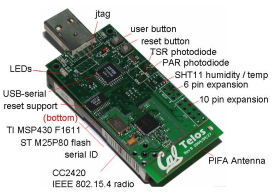


- Wireless Sensor Network (WSN): An autonomous, ad hoc system consisting of a collective of networked sensor nodes designed to intercommunicate via wireless radio.

Wireless Sensor Network

- Wireless – Communication via radio waves
- Autonomous – Independent, self-configurable, self-managing
- Ad hoc network – A network without a fixed, well-defined infrastructure
- Sensor node – Device that produces a measurable response to a change in physical condition

Berkeley Mote



Advances in Wireless Sensor Nodes

Consider Multiple Generations of Berkeley Motes

Model	Rene	Mica	Mica-2	Mica-Z
Date	1999	2002	2003	2004
CPU	4 MHz	4 MHz	4 MHz	4 MHz
Flash Memory	8 KB	128 KB	128 KB	128 KB
RAM	512 B	4 KB	4 KB	4 KB
Radio	10 Kbps	40 Kbps	76 Kbps	250 Kbps

Historical Comparison

Consider a 40 Year Old Computer

Model	Honeywell H-300	Mica 2
Date	6/1964	7/2003
CPU	2 MHz	4 MHz
Flash Memory	None	128 KB
RAM	32 KB	4 KB

Typical Sensor Network Applications

- Environmental monitoring
- Habitat monitoring
- Wildfire detection
- Structural health monitoring
- Power grid monitoring
- Health applications
- Supply chain management

Military

- Desirable characteristics of sensor networks
  - rapid deployment,
  - self-organization
  - fault tolerance
- Example applications
  - Monitoring friendly forces, equipment and ammunition
  - Battlefield surveillance
  - Reconnaissance of opposing forces and terrain
  - Targeting
  - Battle damage assessment
  - Nuclear, biological and chemical attack detection and reconnaissance

Environment

- Desirable characteristics of sensor networks
  - Untethered sensors
  - No interruption to the environment
  - Redundancy
- Example applications
  - Forest fire detection: Strategically, randomly, and densely deployed sensor nodes can relay the exact origin of the fire.
  - Biocomplexity mapping of the environment: integrating information across temporal and spatial scales.
  - Flood detection: rainfall, water level and weather sensors supply information to the centralized database system.
  - Precision Agriculture: the pesticides level in the drinking water, soil erosion, and air pollution.