WSN Research at IISc

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Outline

- WSN Research at IISc
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- Integrated Mote Challenges

WSN Research at IISc

- 3 year project funded by DRDO-CAIR
  - Starting from Sept 2006
- 11 Faculty from four departments

Networking
Anurag Kumar (ECE)
Joy Kuri (CEDT)
Pavan Nuggehalli (CEDT)

Communications
P. R. Vijaykumar (ECE)
Rajesh Sunderesan (ECE)

Electronics
Bharadwaj Amrutur (ECE)

Signal Processing
Vinod Sharma (ECE)

Sensors
Navakant Bhat (ECE)
G.K.Anantsuresh (ME)

Compilers & OS
Y.N.Srikant (CSA)
R.C.Hansdah (CSA)

Application Classification

- Detection, location, classification and tracking of point events
  - e.g. Intrusions of a small set of people or vehicles
- Detection and mapping of events covering large regions
  - e.g. Floods, forest fires, damage to the network itself
- Estimation of a continuously varying random field
  - e.g. Air quality levels, soil characteristics, temperature, etc.
- Assistance in Navigation and Guidance
  - e.g. Through a geographical area
- Monitoring of inventory levels
  - e.g. Large warehouse, battle field resources

Application Selection

- Detection, location, classification, tracking
  - Perimeter Fencing
    - Detecting intrusion in a geographically small area
      - e.g. Building premises
  - Border Surveillance
    - Detecting, identifying and tracking of intruders into country's borders

High level requirements

- Select Sensor modalities
  - e.g., vibration, acoustic etc.
- Sensor deployment
  - Get k-coverage
- Distributed signal processing algorithms for inferencing
  - Information fusion and distributed computation
- Networking algorithms for
  - Network formation
  - Locationing
  - Self-healing
- Security
  - Jam resistance

Border surveillance

- Problem Scenario
  - Large area normally free of human or vehicular activity
  - Intrusion by humans/vehicles into protected areas at random locations and times
- Inference
  - Detect, locate, classify and track intrusion
- Performance specs
  - Probability of false alarm, Probability of detection, probability of misclassification, detection delay, tracking errors
- Network lifetime
  - Several years

Deliverables

- Design plan
- Algorithms
- Prototype with off the shelf motes
- Prototypes of critical pieces of the electronics, sensors, compilers, OS

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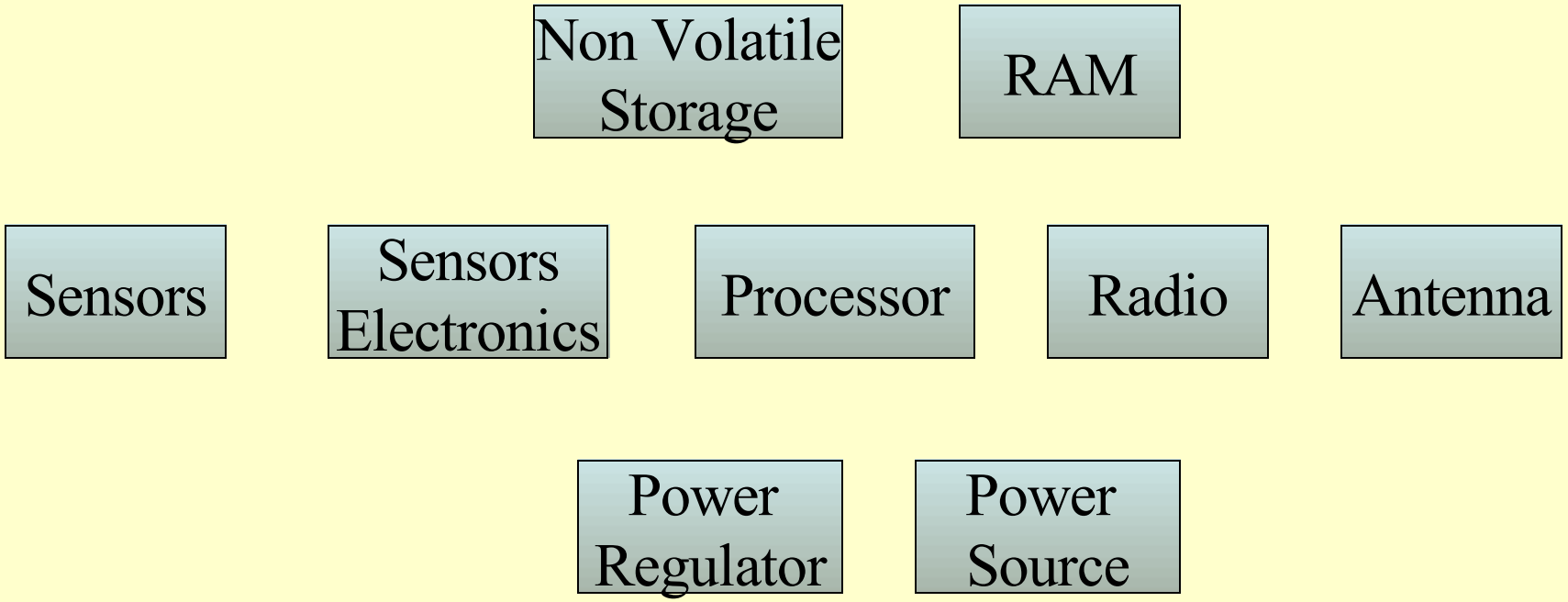
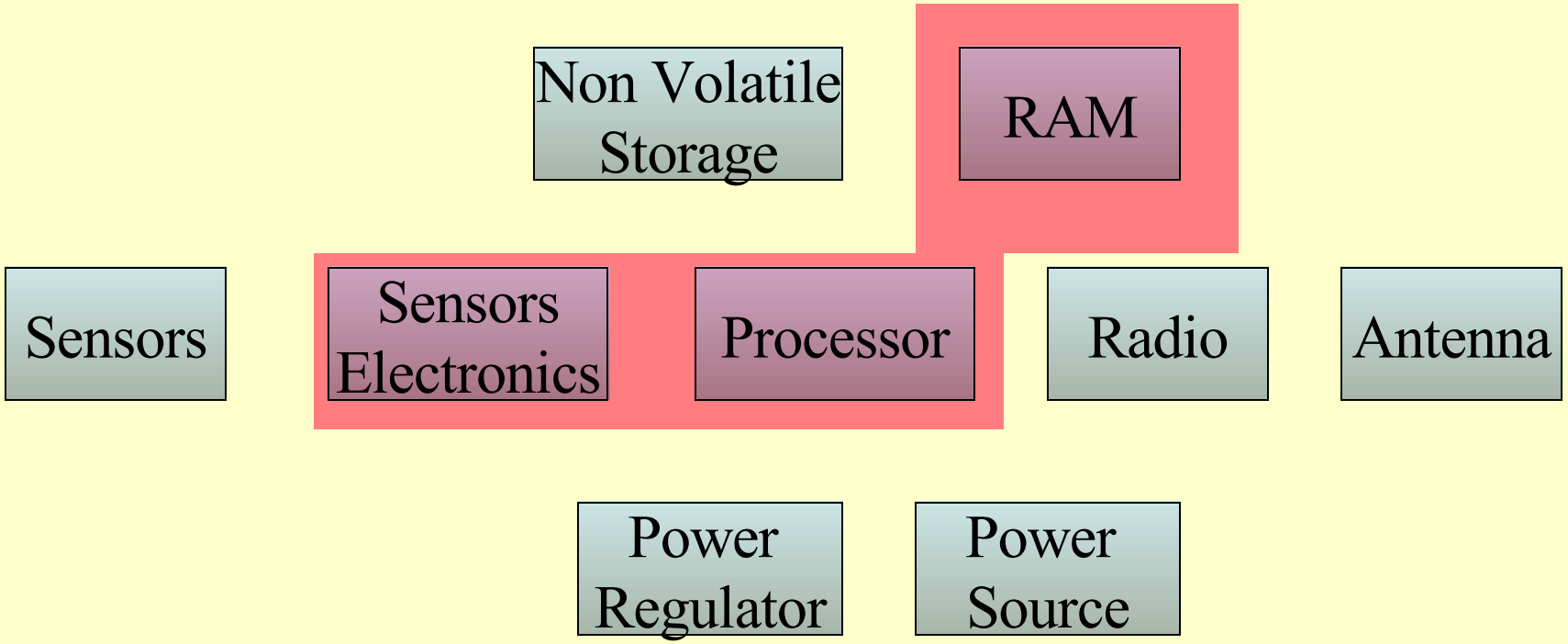
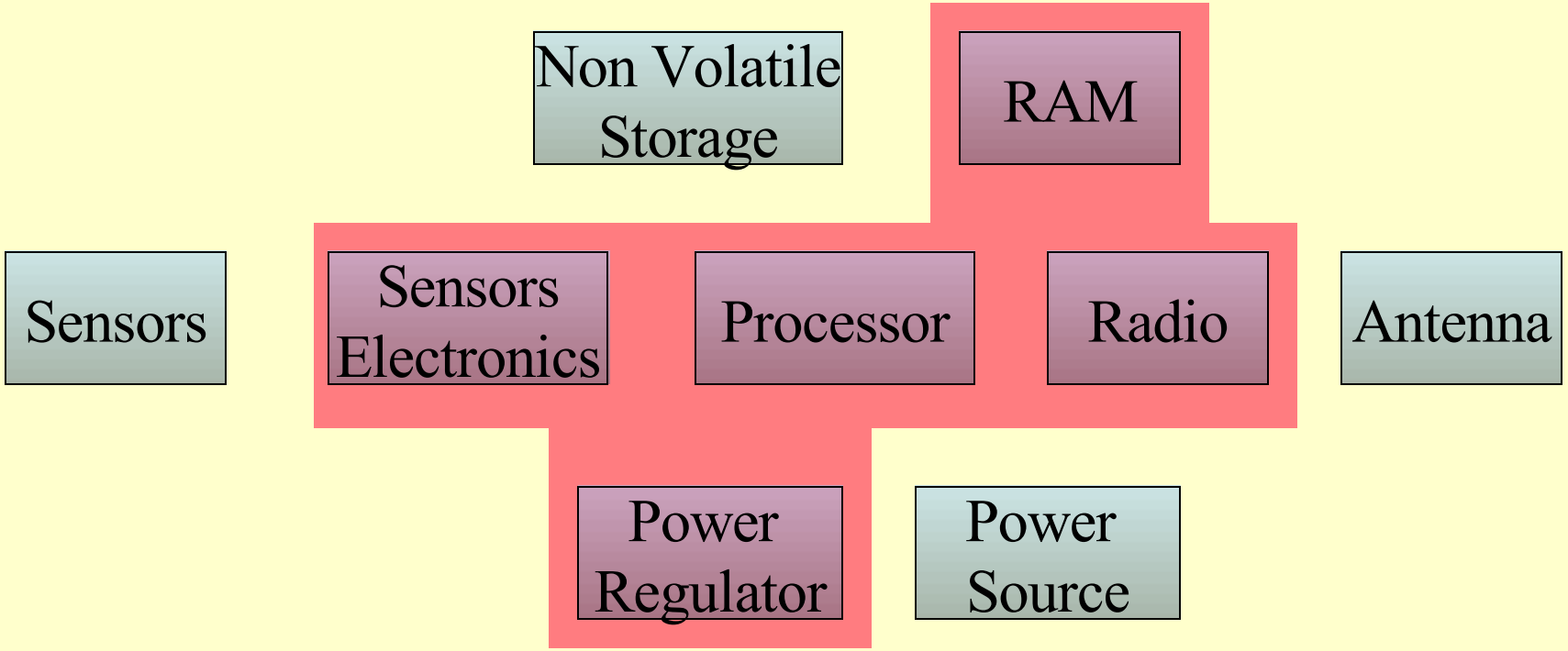
What is in a Mote



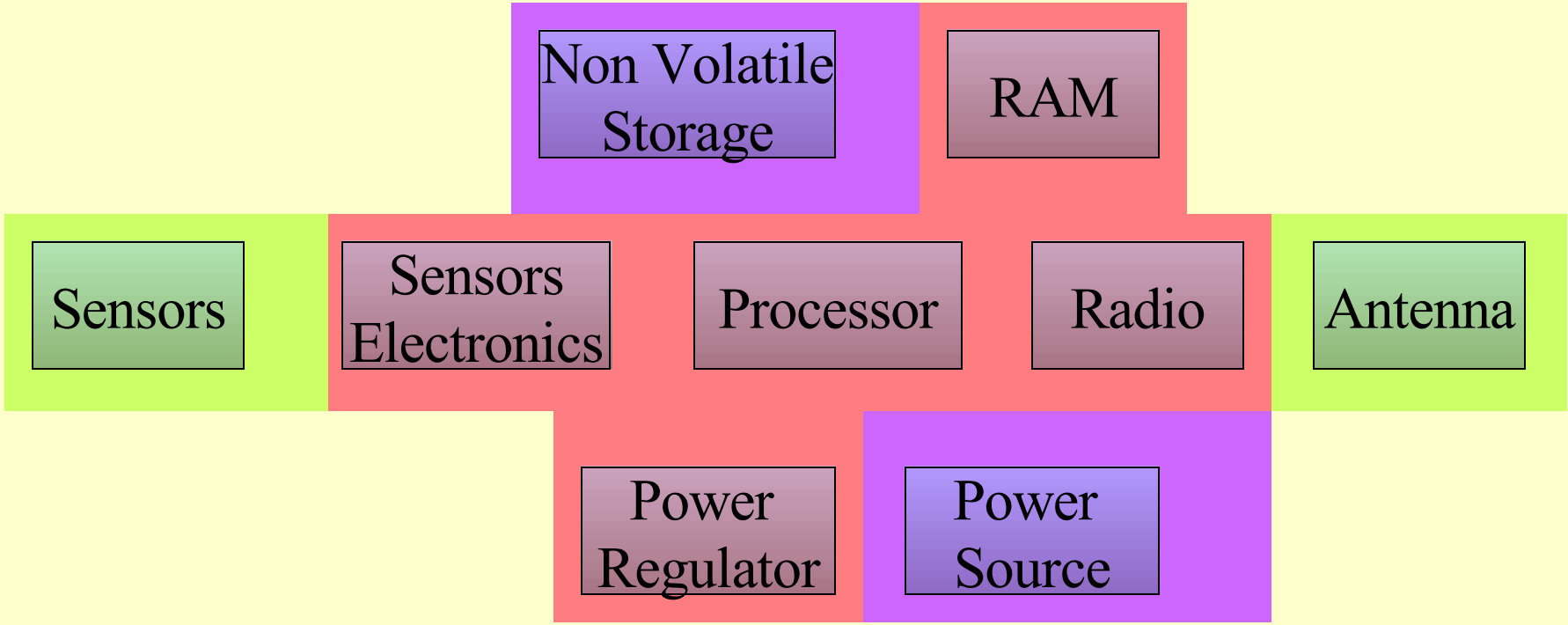
Commercial Motes



Integrated CMOS Mote (This Project)



CMOS + MEMs + SIP Mote



Thank you
(http://ece.iisc.ernet.in/sensors)