IDHAYA COLLEGE FOR WOMEN, KUMBAKONAM

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

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SEMESTER	**:**	**IV**
CLASS	**:**	**II M.Sc(CS)**
SUBJECT IN-CHARGE	**:**	**Ms.M.VAISHNAVI**
SUBJECT NAME	**:**	**WIRELESS SENSOR NETWORKS**
SUBJECT CODE	**:**	**P16CS42**

UNIT - V

SENSOR NETWORK PLATFORMS AND TOOLS

Sensor Node Hardware. Berkeley Motes, Programming Challenges, Node level software platforms, Node-level Simulators, State-centric programming.

Sensor Network Platforms and Tools

SENSOR NODE HARDWARES

❖ **Sensor node hardware can be grouped into three categories**

☐ *Augmented general-purpose computers*

☐ *Dedicated embedded sensor nodes*

☐ *System-on-chip (SoC)*

❖ **Berkley motes due to their small form factor, open source software development, and commercial availability, have gained wide popularity in the sensor network research community**

AUGMENTED GENERAL-PURPOSE COMPUTER

❖ Off-the-shelf operating systems such as WinCE, Linux and

❖ with standard wireless communication protocols such as

   802.11 or Bluetooth.

❖ Relatively higher processing capability

❖ More power hungry

❖ Fully supported

❖ popular programming languages

❖ Ex: PDAs

DEDICATED EMBEDDED SENSOR NODES

❖ In order to keep the program footprint small to accommodate their small memory size, programmers of these platforms are given full access to hardware but barely any operating system support.

❖ Typically support at least one programming language, such as C.

❖ Ex: mica, TinyOS, nesC

SYSTEM-ON-CHIP (SOC)

❖ **Build extremely low power and small footprint sensor nodes that still provide certain sensing, computation, and communication capabilities.**

❖ **Currently in the research pipeline with no predefined instruction set, there is no software platform support available.**

UC- Berkeley mote
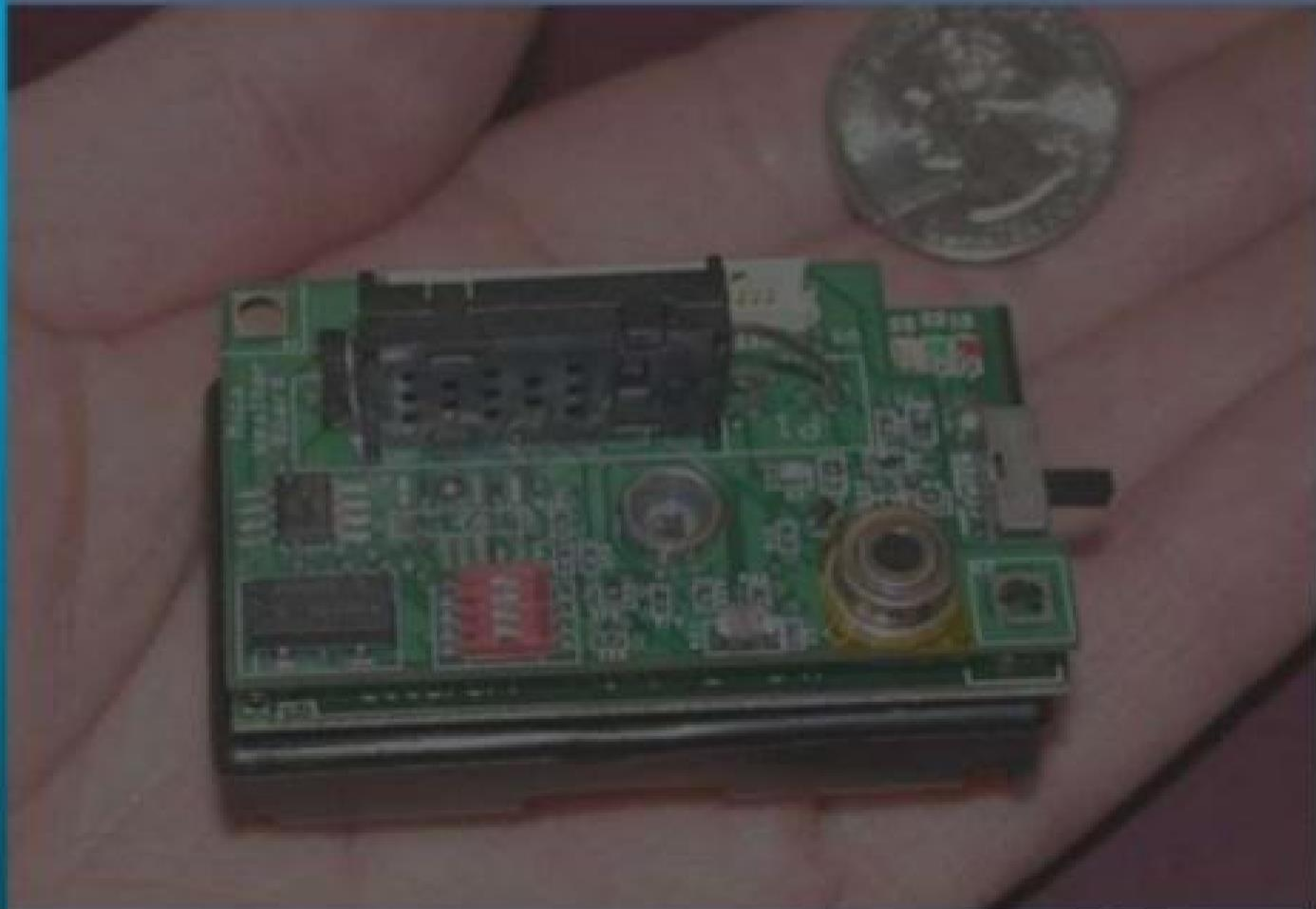
SENSOR NETWORK PROGRAMMING CHALLENGES

❖ **Event-driven execution allows the system to fall into low-power sleep mode when no interesting events need to be processed.**

❖ **At the extreme, embedded operating systems tend to expose more hardware controls to the programmers, who now have to directly face device drivers and scheduling algorithms, and optimize code at the assembly level.**

NODE-LEVEL SOFTWARE PLATFORMS

❖ **Node-centric design methodologies: Programmers think in terms of how a node should behave in the environment.**

❖ **A node-level platform can be a node-centric OS, which provides hardware and networking abstractions of a sensor node to programmers.**

Node-Level Simulators

For engineer to perform performance study, which in terms of

➢Power

➢Bandwidth

STATE-CENTRIC PROGRAMMING

❖ **Applications that isn't just simply generic distributed programs over an ad hoc network.**

❖ **We have to centralize data into nodes.**

❖ **EX: target tracking**

STATE-CENTRIC PROGRAMMING

Def:

X: state of a system

U: inputs

Y: outputs

K: update index

F: state update function

G: output observation function

THANK YOU