# 微机原理及接口技术

# Hardware Principles and Interfacing of Modern Computer

## Topic: Future Computer

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# Who Dominates The Future ?

- 市场还是技术？
  - 市场导向论：在传统行业中起决定作用
  - 技术驱动论：在高新技术行业中地位显著
- 令人吃惊的摩尔定律
  - 不论人们如何争论，都无法回避现代社会呈加速度趋势高速发展的事实，摩尔定律看来只是这种加速趋势在计算机工业中的一个具体反映。

# Future Trends

- 回顾：让历史告诉未来
  - 历史上：大型机时代和PC机时代
  - 今天(特别是离开我们还不太远的20世纪90年代)：
    - 大型机越来越小，小型机和PC机越来越强，彼此之间的界限趋于模糊，甚至有人发出“大型机必将灭亡”的预言
  - 未来：“超大”和“超小”
- 未来世界：超级计算和超小计算并存
  - 超级计算：以**巨型机的重生**和**GRID计算**的兴起为代表
  - 超小计算：以嵌入式系统的兴起为标志，计算设备将更加小，网络的作用将更加突出，最终走向无所不在的计算

# Future Trends

- 诸君在控制系读书的未来
  - 一个不一定正确的建议：

    走超小计算之路
  - 国际趋势和热点： Ubiquitous Computing, Embedded Computing, Pervasive Computing, Disappearing Computing, Embedded Mobile Computing, Wireless Sensor Networks, Wearable Computing, MEMS, Bio-Chip, ……
  - 计算与通信的结合：可作为因特网延伸的无线传感器网络
  - 计算与微机械、光学的结合：MEMS
  - 计算与生物技术的结合：集成化生物检测芯片
  - 计算与检测技术的结合：智能数字传感器
  - 计算与人体的结合：human or robot?
  - ……

# Future Computer

- 由计算原理改变而导致的完全新型的计算装置
  - DNA Computing
  - Quantum Computing

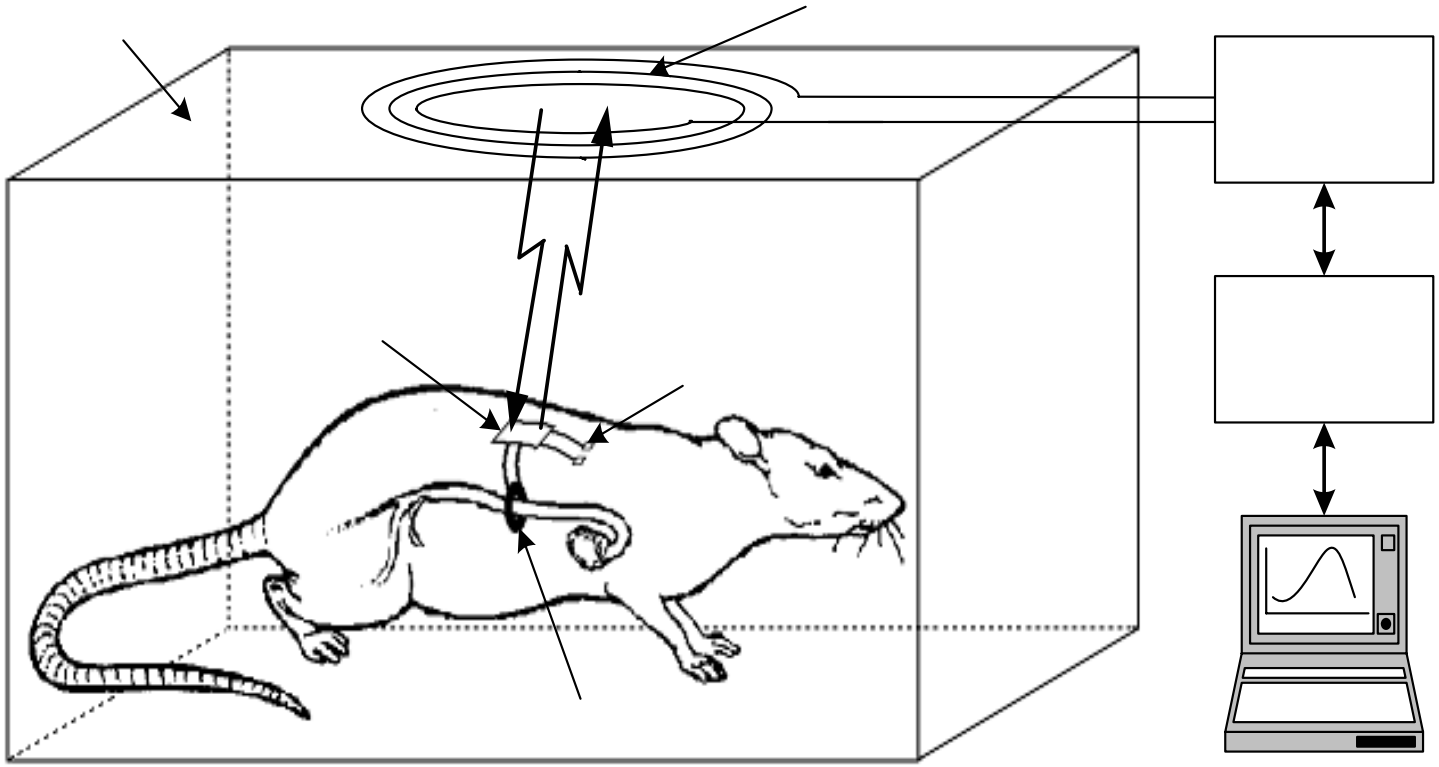
# Future Computer

- **The Future: Off the Desk**
  - Already we are seeing powerful computers in non-desktop roles. Laptop computers and personal digital assistants (PDAs) have taken computing out of the office. Wearable computers built into our clothing and jewelry will be with us everywhere we go.

# Implantable Biological Intelligent System

Darrin Young (PI), Wen Ko, Joe Nadeau, Kenneth Loparo, Murat Cavusoglu

EECS and Genetics Departments, Case Western Reserve University



Mouse Cage

- *In vivo* real time biological monitoring
- Pressure, temperature, EKG, and activity sensing with two-way telemetry
- Integration of sensor arrays, electronics, and power source
- New genetic function identification
- New treatment for cancer and diseases

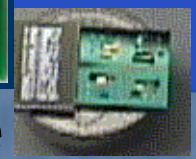
# Intelligent Sensor & Wireless Sensor Networks

PC

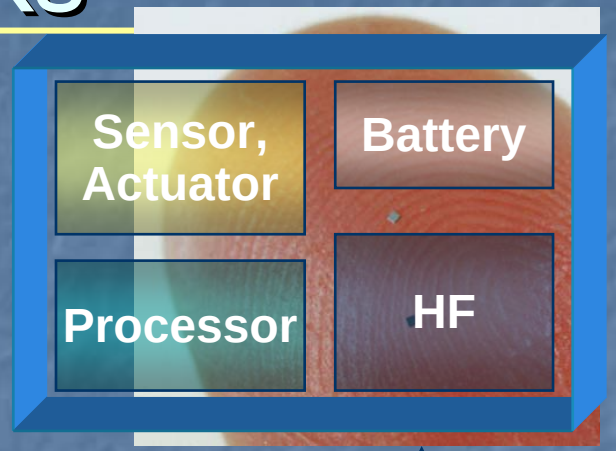
Picoradio (UCB)

WINS (UCLA)

Blue-Node (UoR)



Smart Dust (UCB)

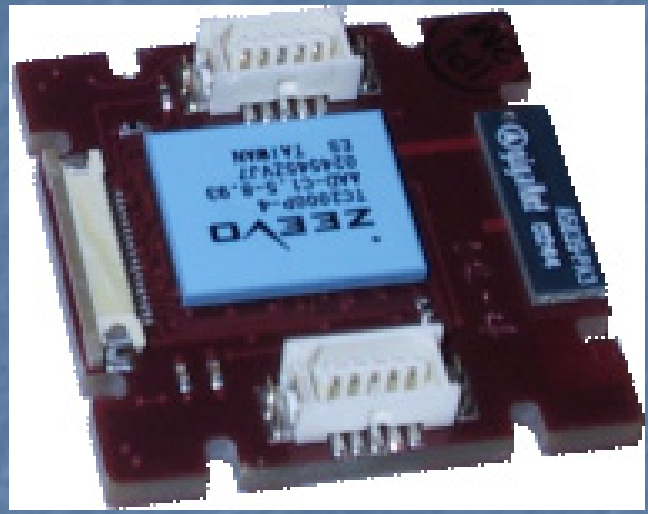



Piece of Silicon

| Mote Type | WeC | Rene | Rene2 | Dot | Mica |
|---|---|---|---|---|---|
| |  |  | |  |  |
| Date | Sep-99 | Oct-00 | Jun-01 | Aug-01 | Feb-02 |
| Microcontroller (4MHz) | | | | | |
| Type | AT90LS8535 | | ATMega163 | | ATMega103/128 |
| Prog.Mem.(KB) | 8 | | 16 | | 128 |
| RAM (KB) | 0.5 | | 1 | | 4 |
| Communication | | | | | |
| Radio | RFM TR1000 | | | | |
| Rate (Kbps) | 10 | | | | 10/40 |
| ModulationType | OOK | | | | OOK/ASK |

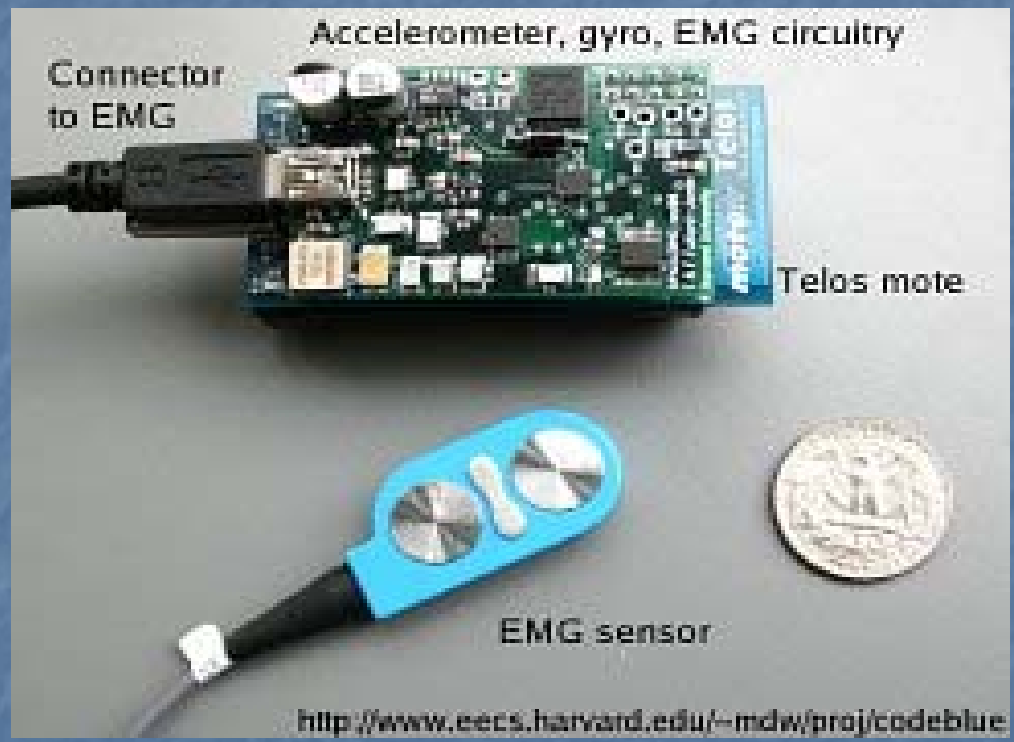
**Fig. 3.** Evolution of motes from the Berkeley TinyOS group.

# Intel 的研究项目



- Mote原型（3×3cm）
- 以Mote为原型的节点每个$50-$100， 未来5年(2004)
- 将下降到少于$5

# Sensor Node for Medical Care (Harvard)

# 计算无处不在

# Ubiquitous Computing