Millimeter-Scale Smart Sensing Semiconductor Devices for Next-Generation IoT Applications

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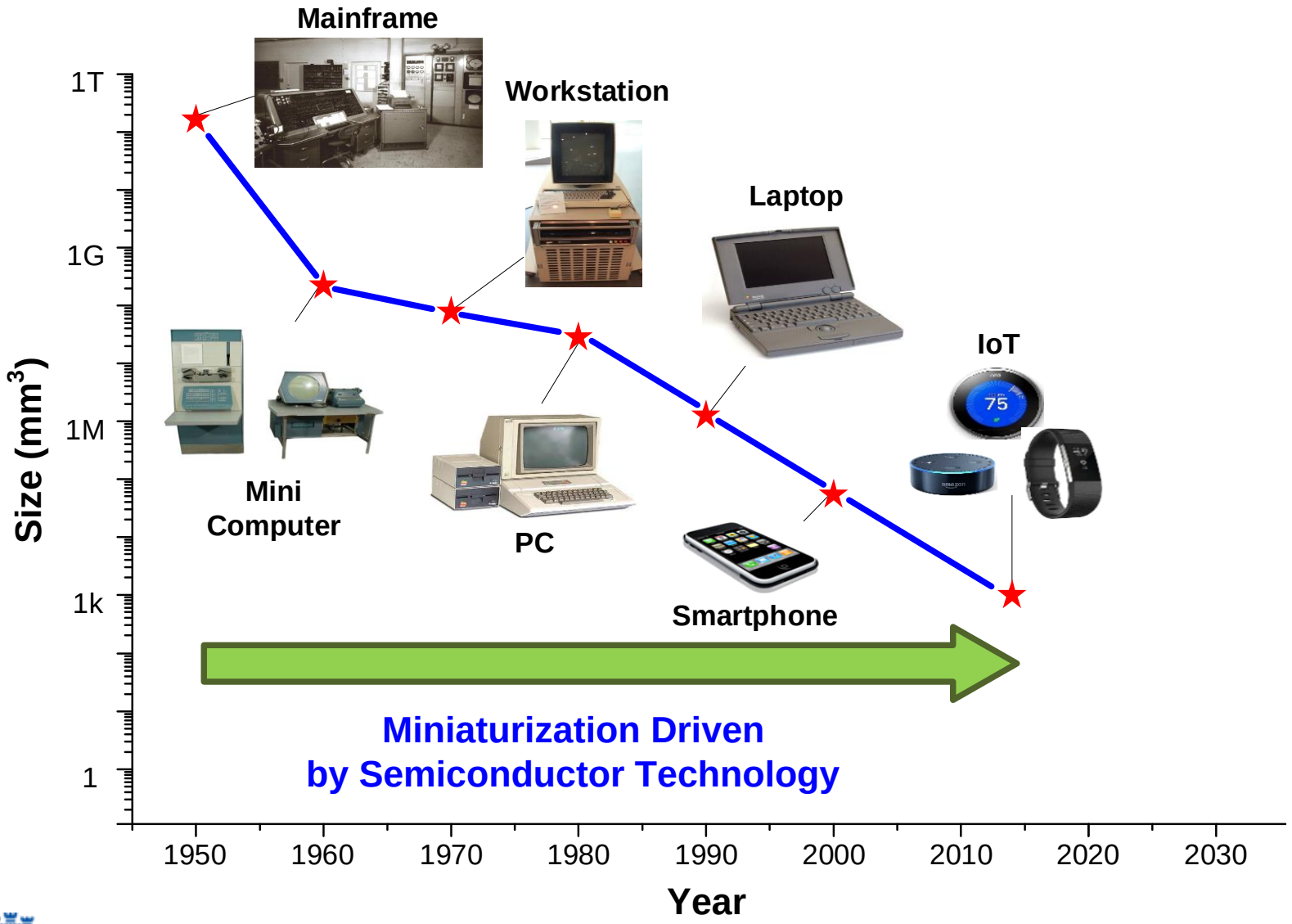
University of Pittsburgh

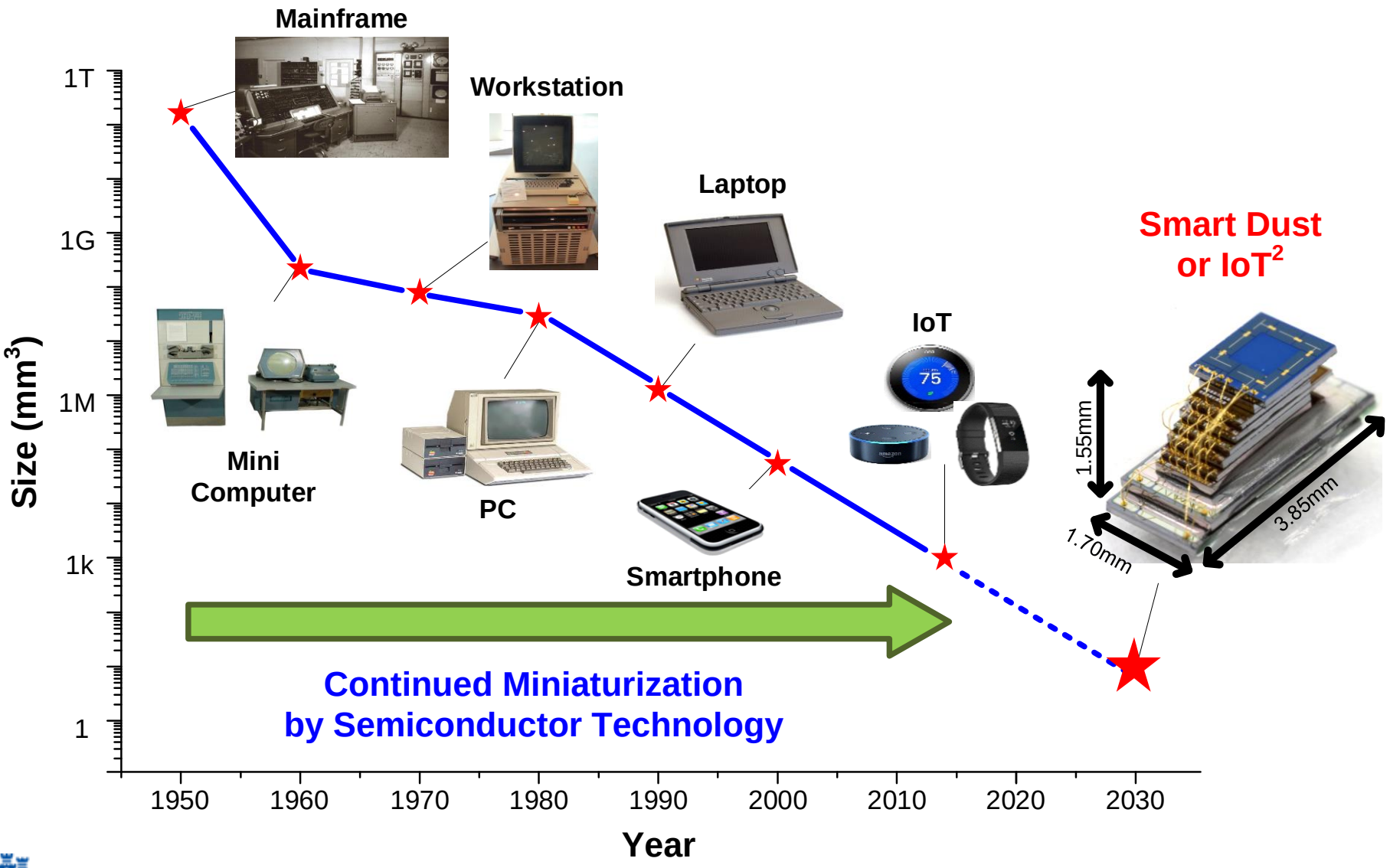
PITT | SWANSON ENGINEERING

ELECTRICAL & COMPUTER

Past Computing/IoT Systems

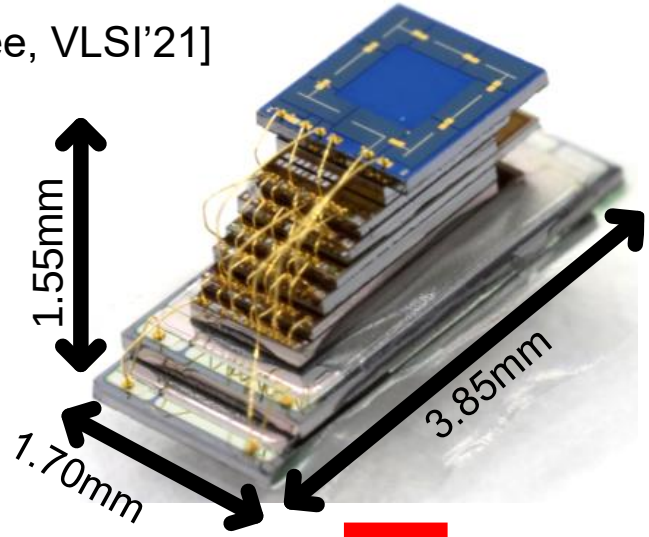


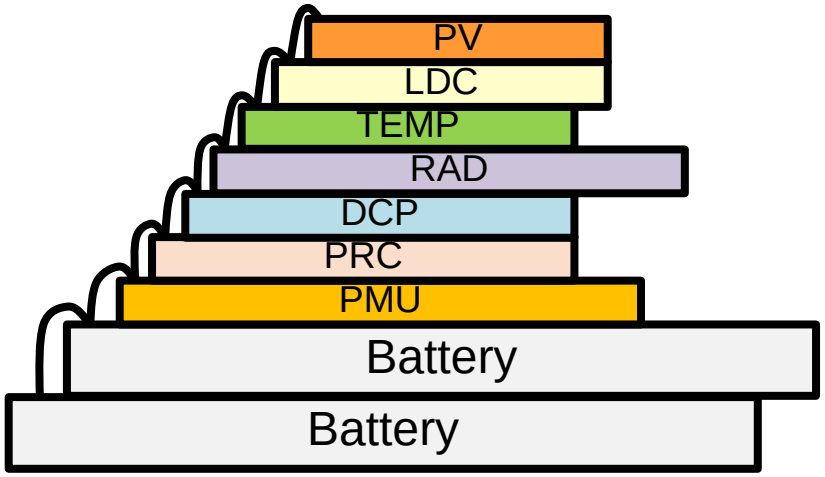
Internet-of-Tiny-Things (IoT^2)



IoT² Semiconductor Device

[Lee, VLSI'21]





- Proposed in ISSCC 2012
- Modular die-stacked structure
- Maximize circuit design area per volume
- Enables diverse technology
- Swappable layers

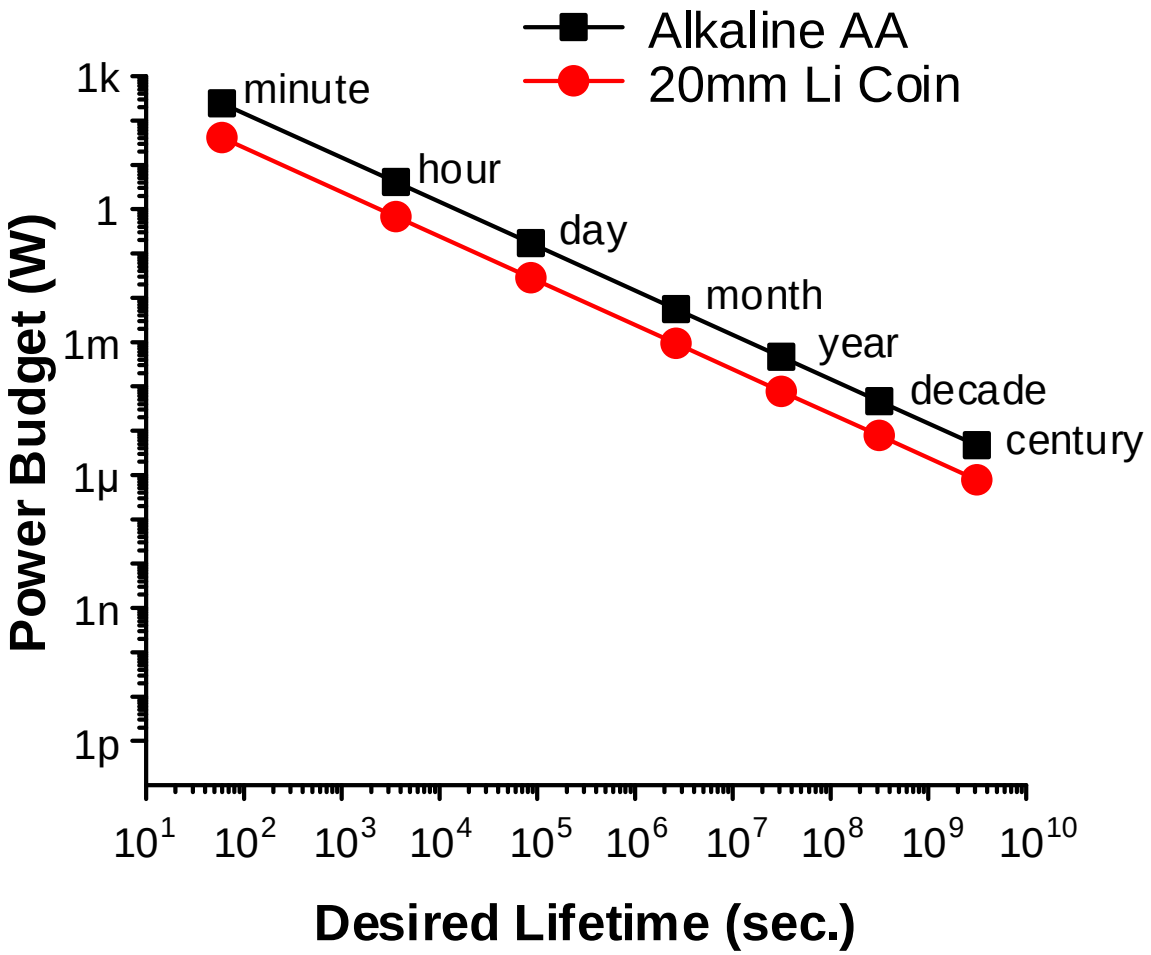
- ~10μA active mode (< 100ms)
- ~10nA sleep mode (> 1min.)
  → Only turn on low-power power mangement unit, optical receiver, wakeup timer, SRAM

Available Power Budget

Alkaline AA
(9800mm³)

1mm² Li Thin-film
(0.2mm³)

20mm Li Coin
(1280mm³)



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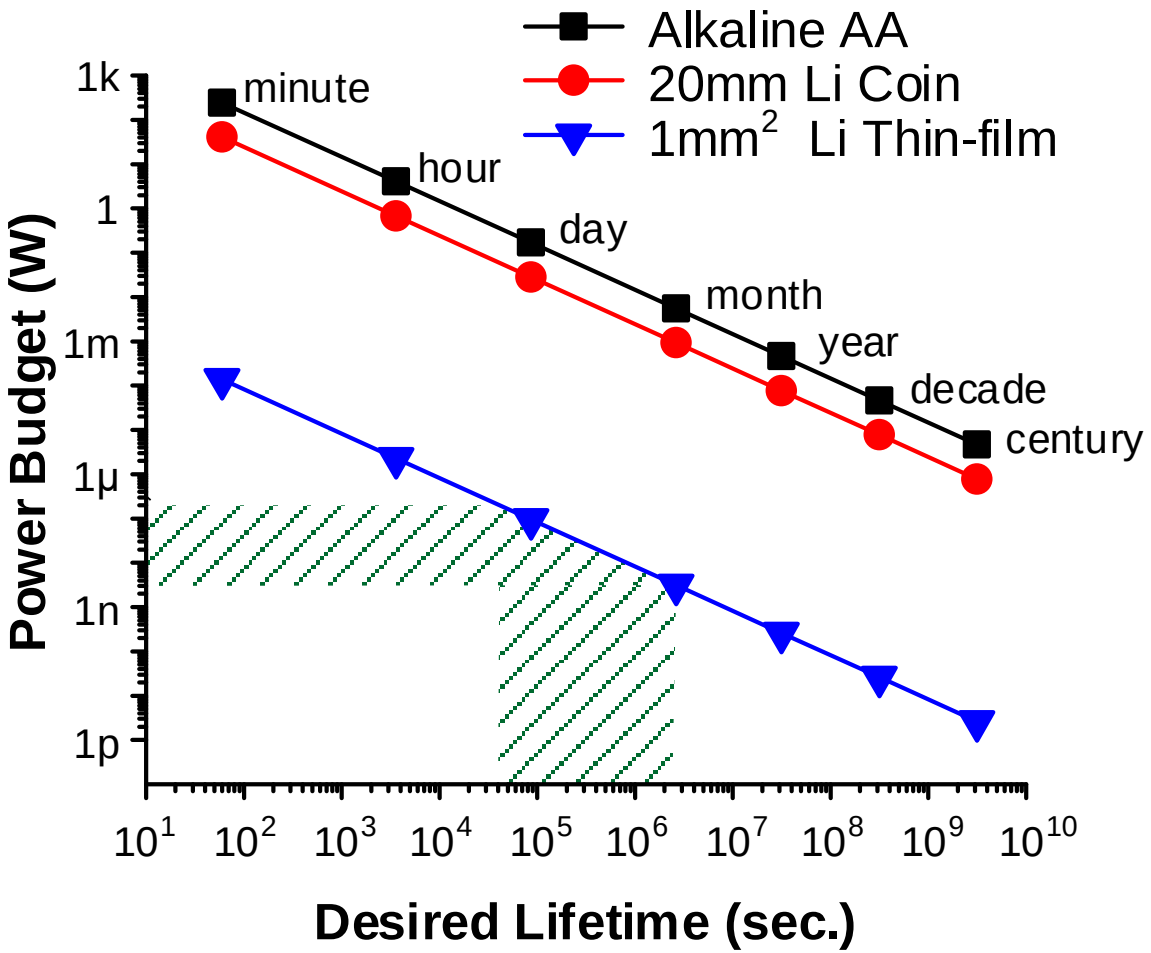

Computer History Museum

Computer History Museum

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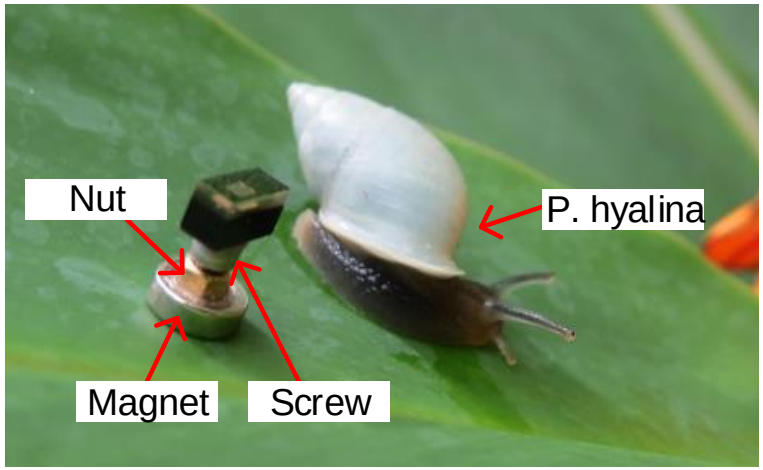
The World's Smallest Com

Dag Spicer March 26, 2015 Curatorial
1 Comment

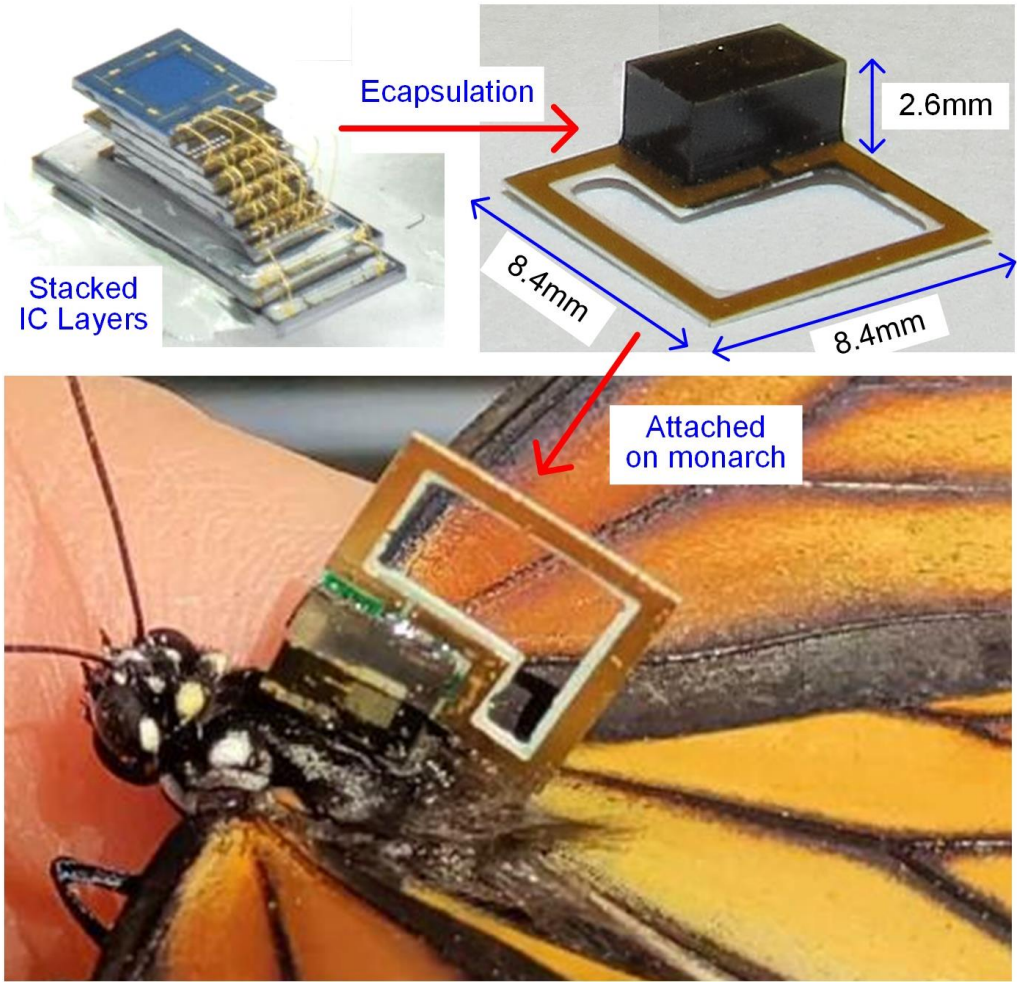
A new exhibit at CHM takes a look at the world's
"Micro Mote." Making things smaller has been p
the field's beginnings. Smaller tends to make tl
Recently, researcher Gordon Bell observed that
according to a regular pattern and prompts new
them) of computer device at more or less regul

http://www.computerhistory.org/atchm/the-worlds-smallest-computer/

Ecological Applications



[Bick, Commun. Biol. '21]



[Lee, MobiCom. '21] **Best Paper Award**