FISC colleagues; thanks for your excellent pre-work to identify research challenges

However I have a few extra-credit questions

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An Intelligent Integrated Sensor Node

Si-Cell

Energy

Logic

Memory

RF

ADC

Sensors

0.5μm

2μm

‘Energy molecules’, e.g. glucose

‘Logic molecules’, e.g. proteins

‘Communication molecules’

Sensor proteins
Quantum Sensors

- There is a notion of Quantum Logic and Memory Devices
- Are there Quantum Sensors?
  - e.g. of nanoscale size and exploring quantum physics
  - Multi-sensing in a small volume?
Sensing for Intelligence?

Benchmark capability $\mu$ (IPS) as a function of $\beta$ (bit/s)

- It does not appear that the microprocessor trajectory will intersect the estimated brain performance.
- The brain operates with multiple sensory organs.
- Is it possible that IC’s that sense are a necessary condition for intelligent computing?

What can we learn about information processing from Nature?
Communication Challenge

- Long-Distance Communication is a very expensive task
- Living cells communicate a lot, but
  - Long distance communication is not used by Nature!
- Swarm-facilitated communication?

A typical communication distance between bacteria ~10μm or 10x of cell size

‘Communication molecules’
How can we effectively manage the explosion of data from a hyper-sensed world?

- Challenge: Conversion of massive data into actionable information!
- Are traditional approaches, e.g., digital pattern recognition, use of data-bases to extract meaning, etc. up to the task?
- If not, what must be done?