ASU Quantum Information Processing Seminar Series
Fall 2021

P-bit: Between a Bit and a Qubit

Wednesday, August 4, 2021, 2:00PM
Via Zoom: https://asu.zoom.us/j/89860857827

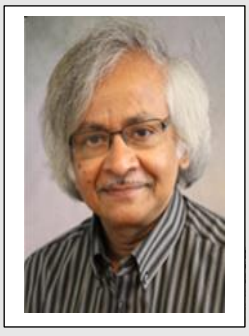
Abstract

Digital computing is based on deterministic bits with two values, 0 and 1. On the other hand, quantum computing is based on qubits which are delicate superpositions of 0 and 1. This talk draws attention to something in-between namely, ***p*-bits** which are robust classical entities fluctuating between 0 and 1 [1].

Feynman [2] used the concept of a probabilistic computer as a counterpoint to the quantum computer, noting that " .. the only difference between a probabilistic classical world and the equations of the quantum world is that .. the probabilities would have to go ***negative*** .. " The awesome power of quantum computing comes from exploiting these negative (more generally complex) probabilities, which in turn requires stringent experimental conditions to protect the phase.

A probabilistic computer by contrast can be built with existing technology to operate at room temperature as we have demonstrated experimentally [3]. They lack the magic of complex probabilities but can function as hardware accelerators for many applications that use stochastic algorithms [4].

[1] K.Camsari and S.Datta, IEEE Spectrum (2021);
[2] R.P. Feynman, *Int. J. Theor. Phys.* **21**, 467 (1982);
[3] W.A. Borders et al. *Nature* **573**, 390 (2019); [4] B.M. Sutton et al. *IEEE Access* **8**, 157238 (2020).



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Bio

Supriyo Datta received his PhD from University of Illinois at Urbana-Champaign in 1979 and has been with Purdue University since 1981. The non-equilibrium Green function (NEGF) method pioneered by his group is widely used for the modeling of quantum transport in nanoscale devices. He is also known for innovative theoretical proposals that have inspired new fields of research including spintronics and negative capacitance electronics.

https://nanohub.org/groups/supriyodatta

Hosts: Arunabha Sen
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This talk will be recorded. To view contact:
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