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6mo · Edited

DEATH OF CMOS !!!!
Death of CMOS is inevitable ... but not yet **...not** just yet
CMOS will be replaced by something else, but, for a common person's use that change is 4 to 5 decades away.

The name CMOS is abbreviation for Complementary Metal Oxide Semiconductor. But, the word CMOS has more meaning to most people than the name it represents. CMOS is technology that transforms sand into chips that do magical tasks, and are backbone of all electronics. Electronics, that powers behemoths like supercomputer down to a smart phone (such as iPhone) and even further down to electronics in a sub-dollar toy singing lullaby to a new born baby. Most electronic gadgets, big or small, owe its existence to CMOS. I have tried it many times and experienced that the phrase "Complementary Metal Oxide Semiconductor" is difficult to explain except for the most curious physics enthusiasts.

So let's stick with CMOS.

For past 2 decades, we have witnessed many experts projecting end of life for CMOS within a few years. But, so far powered by human zeal for innovations, CMOS has become only more prevalent.

CMOS will keep scaling down to 10 picometer (0.1 Angstrom) or even smaller in next 4-5 decades before it gets replaced by Quantum device or something else. Machines, materials, procedures and techniques will be invented to make it happen. CMOS has proven to be resilient against many challenges.

We have overcome many challenges such as wavelength limitations(OPC, patterning), gate oxide stress and threshold voltage limitations (metal-oxide gate, doping, implants, Multi-Vt), channel and source-drain conduction limitations (doping and doping gradients, LDD/MDD/HDD, salicide, stressed/strained silicon), interconnect speed limitations (aluminum, copper wires, dielectric improvements) channel leakage problems (3D transistors, Metal gate) etc.

New technical challenges will arrive and we'll overcome them.

Of course there are risks

One of the biggest risk is the lack of competition fueled by business consolidation. In past 2 decades we have seen significant slow down in momentum for semiconductor innovations. Thanks to bold vision of one visionary, the smartphone chips have kept the innovations for process scaling alive. Innovations in high speed and low power has more or less stalled for past 2 decades. I attribute that to lack of competition. But arrival of AI computers will pretty much take care of this problem. In near and distant future, we'll see more innovations in CMOS speed and low power.

Other risk is global non-cooperation among scientists. This can be caused by many factors including political eco-system.

However, risks that apply to CMOS also apply to alternative technologies as well. Means, CMOS will remain a dominant force for electronics at any given time.. for long time to come..

So what about quantum computing?
We'll talk in next post:-)

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Vikram B. 6mo
Aren't we reaching the physical size limits of an atom when going below 1 nm? Interesting that you mention we can go upto 10 pico. Need a refresher I guess 😊
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Ayonam Ray 6mo
GP Singh, Don't you think that we may have a Q-bit controlled tri-state system sooner than the 4 - 5 decades that you have projected? I was thinking that all that is needed is to find a way to detect the magnetic spin in the electron and a way to set it to the desired direction.
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Siddharth Deshwal 6mo
Interesting!
Like Reply

Narendra Sisodia 5mo
Interesting! I like
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Swapnil S.. 6mo
Great piece!
Like Reply

Rose Dave 6mo
Thanks for sharing the thought
Like Reply

Subhomoy Chattopadhyay 6mo
Well said GP!
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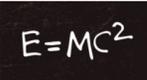
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