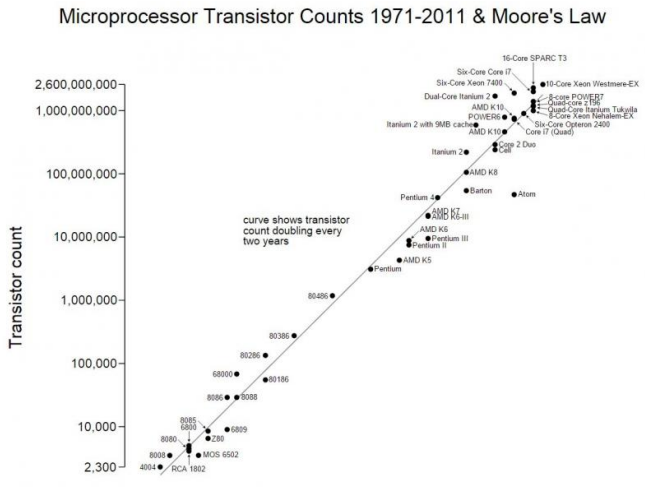
Keeping up with Moore's Law

6 December 2018, by David Bradley



Plot of CPU transistor counts against dates of introduction; note the logarithmic vertical scale; the line corresponds to exponential growth with transistor count doubling every two years. Credit: Wikipedia

These days, Moore's Law is not so much a scientific law as an aspiration. The notion that there is a doubling every year of the number of components that can be squeezed on to the same area of integrated circuitry was first observed in the mid-1960s by Gordon Moore, the co-founder of Fairchild Semiconductor and Intel. Ever since the microelectronics industry has strived to Moore's Law although in some periods that annual doubling seems to occur over a period of 18 months if not longer.

Nevertheless, it still offers a rule-of-thumb for how rapidly technology advances and posits a guideline as to what technology industries might aim for. Now, a paper in the International Journal of Technology Management asks whether technology improvement rates in knowledge industries, microelectronics, mobile communications, and genome-sequencing technologies might follow this law.

Yu Sang Chang of Gachon University, in Seongnam, Jinsoo Lee of the KDI School of Public Policy and Management, in Sejong, and Yun Seok Jung of the Institute for Information and Communications Technology Promotion, in Daejeon, Korea, have tracked technology developments to see whether Moore's Law held over the period 1971 to 2010. Their study shows that indeed it did, moreover they suggest that an analogous exponential law also applies to mobile cellular and genome-sequencing technologies.

While there has been no downward trend in transistor density, the team has found that the improvement rate in microprocessor clock speed has not been sustained. That said, for genome sequencing technology which is essentially still in the early stages of development, developments continue apace.

The team points out that the 5-nanometre limit on the quantum tunnelling effect will represent a barrier to the further shrinking of transistors and that we are fast approaching that limit. However, developments in nanotechnology might still allow the industry to sustain Moore's Law in microelectronics even into its centenary year.

More information: Yu Sang Chang et al. Are technology improvement rates of knowledge industries following Moore's law? An empirical study of microprocessor, mobile cellular, and genome sequencing technologies, *International Journal of Technology Management* (2018). DOI: 10.1504/IJTM.2018.095629

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