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GORDON MOORE AND ARTHUR ROCK'S LAWS IN THE DIGITAL ECONOMY, AN ANALYSIS OF HOW LAWS ARE MADE

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Abstract

This article covers the history of microcircuits in every device used today and the importance of Gordon Moore's and Arthur Rock's laws in the history of microcircuits. We will consider the content of the laws and the history of their formation. We will find out the answer to this question whether these laws are still in force today.

Key words: Gordon Moore, Arthur Rock, CMOS, Operating memory, Intel, VLSI, Microsystems.

The increase in the number of transistors in RAM (random access memory) chips will also double until the advent of microprocessors and abandon the next technology standards, or we will observe a bit. old chips of a certain type. Therefore, we proceeded to calculate the average annual growth in the number of transistors (the growth in YOUR period based on ideal constant growth minus the historical growth from 1971 to 2002) and the difference in the derivative. A best-fit quadratic function, which we interpret as a hypothetical "normal" increase in the number of transistors according to Moore's law. We found that the difference is well reflected in the successful maturation of multi-core systems in microprocessors. It is no coincidence that during this time, the specific increase in the number of transistors in graphics processing units, or VPUs (Video Processing Units), also decreased rapidly. In conclusion, we found that, contrary to the information available in the literature, Moore's Law (in the introductory sense) did not hold until 2002, and probably in 1999, when the final decline in the specific increase in the number of transistors occurred. stopped working.

Transistors are the most important element of modern electronics and microelectronics, and their number in integrated circuits is growing so fast that in 2021, the most complex microprocessor chips have about 50 billion transistors on one chip. Next, we will continue to analyze the physical limit of the development of silicon technology. Even considering a standard technology called CMOS (complementary metal-oxide-semiconductor), which did not exist in 1965, the limit on the number of transistors contradicted empirical data on transistor growth. 'looks. It turns out that its development even slows down: in 1993, growth fell below the historical average. Although we are not experts on this subject, by analyzing various sources and reviews, we can conclude with a high degree of probability that the increase in the number of transistors in the above-mentioned years was after the end of the last wave of technological technological equipment got tired. An upgrade called Minimizing Transistor Costs.

In 1965, ten years after the introduction of the first integrated circuits, Gordon Moore, a former researcher at Fairchild Semiconductor and founder of Intel Corporation, observed that the number of components that could be integrated on a chip doubled every 12 months. In 1975, this period was changed to 24 months by Moore himself. This empirical observation became widely known and is now known as Moore's Law. In this work, we present an analysis of Moore's law and its representation in terms of the number of transistors on a chip.

The "density" at which elements are present in a device often follows Moore's Law, with an exponential plot now showing trillions of components on its vertical axis. Various organizations define a "threshold" beyond which scaling becomes "impossible" and therefore predict a time frame for the slow-down in the density of integrated components from about 2020 to 2040. It appears that Intel may continue to develop silicon scale well into the 1940s. some slow-decreasing synaptic devices - a lot of research is going on in this regard. Advances are being made in alternative "off-Si" devices using carbon nanotubes and 1D materials, but despite decades of research with hundreds of materials under investigation here, no clear advantage has yet been found for fabrication—when these research ideas emerged. unknown. Can become commercial scaling solutions beyond Si. Quantum Information Devices from several companies and research groups is commercializing a new route to storing and transmitting information in the quantum degrees of freedom of confined fracturing devices. However, the functional qubits produced grew more slowly than predicted in the scientific literature. As devices begin commercial integration into silicon, they will be placed alongside classical silicon as new axes of scaling, potentially scalable in a Mures-like manner.

Moore's Law is named after Gordon Moore, one of the founders of Intel Corporation. This is a simple observation about the history of computing technology. In a 1965 three-page paper, he wrote about the rapid development of electronic technology and observed that the limit to the number of components that could be placed on an integrated circuit at minimal cost was only a function of technological progress. It is

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famous for the fact that the number of components in the densest integrated circuit doubles every two years, because the price does not change. 50 years later, his observation is remarkably clear: understanding and innovation at this scale has driven the multibillion-dollar semiconductor industry and fueled, in part, remarkable advances in devices like the smartphone and IBM's Watson, a quiz g took out. a supercomputer that has achieved commercial success in medical diagnosis and treatment; all contain billions of elements. Scaling is mainly based on miniaturization of silicon devices. Calling Moore's observation a "Law" may suggest that it is "unbreakable"; in practice it is very close to its limits and new ideas are needed to restore its growth. While this article suggests technologies that will drive further growth, innovative solutions should never be discounted.

The phenomenal growth rate of transistors has prompted researchers to analyze different technologies. While simple and basic logic gates were implemented in robot domain simulation, today microcontrollers are used to facilitate many services from the basic operation of the robot to its minor operations. The reduction in size and improvement in power consumption favors the use of microcontrollers instead of logic gates. Central processing units or central processing units (CPUs) have targeted significant changes in the industry, as evidenced by the rapid development of transistors in Pentium microprocessors over a period of time to offerings such as the i3, i5, i7, and i9, respectively.

Because of this rapid development, mobile phone processors will replace computer processors within a few years, according to Intel and Moore. Continuous research, optimization and improvement have helped us to do many things in more efficient ways, just as the concept of multitasking offers the possibility to control many mechanisms in parallel with several operations. The importance of transistors in technology is evidenced by the exponential growth of their number. If this trend continues in the coming years, 0.94 billion transistors will be produced by 2028. This exponential growth of transistors has been effective since the invention of transistors. The discovery of transistors revolutionized the electronics industry, leading to the discovery of VLSI (very large scale integration) technology, which allowed microscopic devices to be integrated on a chip. The integration of transistors spurred the production of the modern digital world, as today's digital world is supported by transistors. The exponential increase in the number of transistors has allowed new products on the market to be more efficient and sophisticated than they were a few decades ago. Among the various transistors, the main turning point in the use of transistors was Microsystems, which enabled the implementation of

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modern era equipment and technologies, making them intelligent and imitating people.

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