Connected society

A new journal for a new era of electronics.

On 19 April 1965, Gordon E. Moore, co-founder of Intel and then director of research and development at Fairchild Semiconductor, declared that “The future of integrated electronics is the future of electronics itself”¹. The ensuing paper famously went on to suggest that the number of components in an integrated circuit would approximately double every year (Moore later revised this to every two years²). This prediction, Moore’s law, which has, over the last 50 years or so, driven progress in the semiconductor industry and underpinned vast social and economic development, is now widely thought to be approaching its end. Choosing this as the moment to launch a journal dedicated to the field of electronics could, then, seem ill-timed. But the demand for more and better electronics has never been higher, and the challenges and potential of the field have never been greater.

The opening of Moore’s 1965 essay also speculated about the impact of integrated circuits, predicting the development of home computers, automatic controls for cars, and mobile phones (or, as he put it, “personal portable communications equipment”). Today, such technology is commonplace, influencing almost every aspect of society. Research in the field of electronics is also now remarkably diverse: it stretches from the study of novel phenomena and devices, to the design, construction and wider application of electronic circuits. And it incorporates the work of scientists (including physicists, nanotechnologists, chemists and materials scientists), engineers (including electronic, electrical, mechanical and biomedical engineers) and researchers in industry.

This diversity is something we hope to reflect in *Nature Electronics*. In this first issue, for example, we include

research from across science, engineering and technology. There are Articles on: [integrated circuits](#) (specifically, five-stage ring oscillators) made from carbon nanotubes, which can offer a performance comparable to silicon CMOS technology; [inductors made from intercalated graphene](#), which could be used to develop ultra-compact wireless communication systems; and [analogue computing with memristor arrays](#), which could provide a more efficient alternative to conventional digital computing in Internet of Things (IoT) applications.

This issue also features [collaborative work](#) from academic researchers and a semiconductor device manufacturer on identifying defects buried in flash memory devices by exploiting the inherent hyperbolic metamaterial structure of the devices. There is [research on](#) the distortion-free measurement of electric field strength with compact MEMS sensors, which could be of value in applications such as lightning research. There is a [report on](#) a method that directly modulates the external and internal mechanical motion of a person onto radio-frequency signals, which can be used to monitor a person’s vital signs without direct contact with their skin. Finally, there is an [Article on](#) ingestible electronic capsules that sense different gases in the gut, and could potentially be used to help develop individualized diets.

This first issue also includes a broad range of Perspective articles. To start, [Mohammed Zidan, John Strachan and Wei Lu](#) examine the future of memristor-based electronics, exploring the use of such devices in on-chip memory, biologically inspired computing and general-purpose in-memory computing. [Kris Myny](#) then considers the potential of flexible integrated

circuits in the development of IoT and wearable applications, also proposing the concept of a Moore’s law for flexible electronics. Finally, [Hassan Khan, David Hounshell and Erica Fuchs](#), drawing on technical and organizational archival work and oral histories, discuss science and research policy at the end of Moore’s law, arguing that significantly increased public funding, as well as leadership beyond traditional stakeholders, is now required in the semiconductor industry.

As well as these forward-looking articles, we also explore past achievements. In particular, we have a series in the journal called Reverse Engineering, dedicated to the history of seminal technologies: in this issue, the invention of the first commercial microprocessor, the Intel 4004, is [recounted](#) by its project leader and designer, Federico Faggin.

Here at *Nature Electronics* then, we will focus on the development of technology and on understanding the impact such developments could have on society. This will require consideration of fundamental and applied research, as well as an exploration of the wider social, ethical and legal issues that surround the implementation of new technology. We aim to connect the work of scientists, engineers and industry, and provide analysis of the key issues shaping the field and the key technologies reshaping society. Moore’s law may be coming to an end, but it’s just the beginning for *Nature Electronics*. □

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References

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2. Moore, G. E. *IEDM Tech. Digest* **21**, 11–13 (1975).