Argonne NATIONAL LABORATORY

WHAT IS MICRO-ELECTRONICS?

The technology behind the power of computers, smart phones, autonomous cars, and more

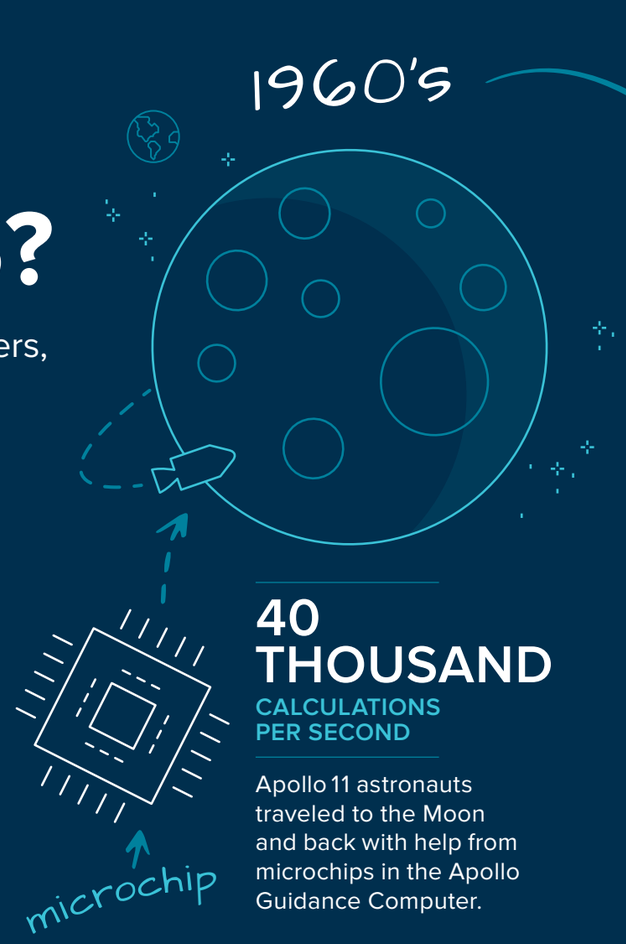
Ultrasmall electronic components process information in all smart electronic devices. In 1969, they guided the spaceship with two astronauts that landed on the Moon and returned safely. Today, they touch our lives in the form of cell phones, computers, smart TVs, global positioning systems, and more. Ever more powerful microelectronics are essential to progress in scientific research.

Microelectronics has entered a new phase due in part to the advances in Artificial Intelligence (AI). Already making their way into the market are self-driving vehicles. Skin-like AI-based materials that diagnose possible health problems are on the horizon.

But microelectronics is at a crossroads. Without radically new technology, the total energy devoted to all the microelectronics will soon reach staggering proportions.

Argonne is tackling this challenge. Our scientists are pursuing new pathways to materials and devices that consider the use of the devices, leading to more energy-efficient and environment-friendly micro-electronics for the 21st century.

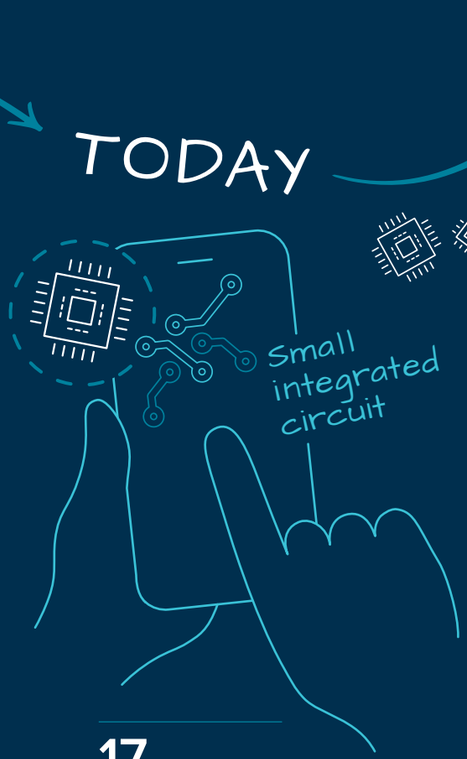
Learn more at **www.anl.gov/microelectronics**.



40 THOUSAND

CALCULATIONS PER SECOND

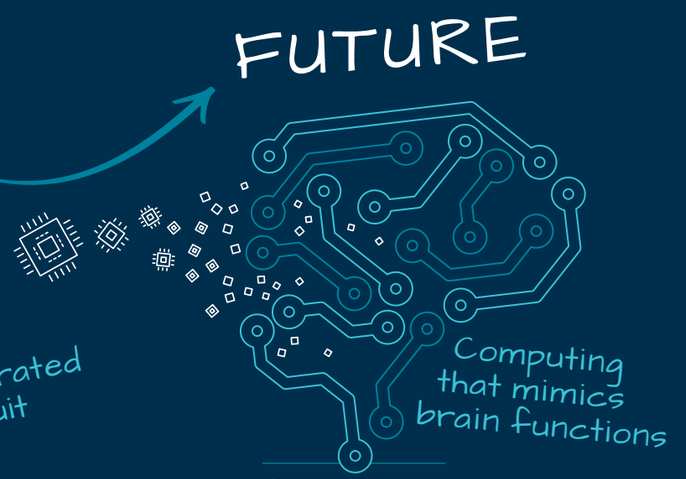
Apollo 11 astronauts traveled to the Moon and back with help from microchips in the Apollo Guidance Computer.



17 TRILLION

CALCULATIONS PER SECOND

Thanks to ever smaller and faster microchips, today's smartphones are many millions of times more powerful than the Apollo 11 guidance system.



2 BILLION-BILLION

CALCULATIONS PER SECOND *AND BEYOND!*

Significantly more energy-efficient and faster computers will one day run by simulating how the human brain works.

- ✓ Reduced energy use
- ✓ Less critical materials use
- ✓ Less environmental impact
- ✓ Many more discoveries

U.S. DEPARTMENT OF ENERGY
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