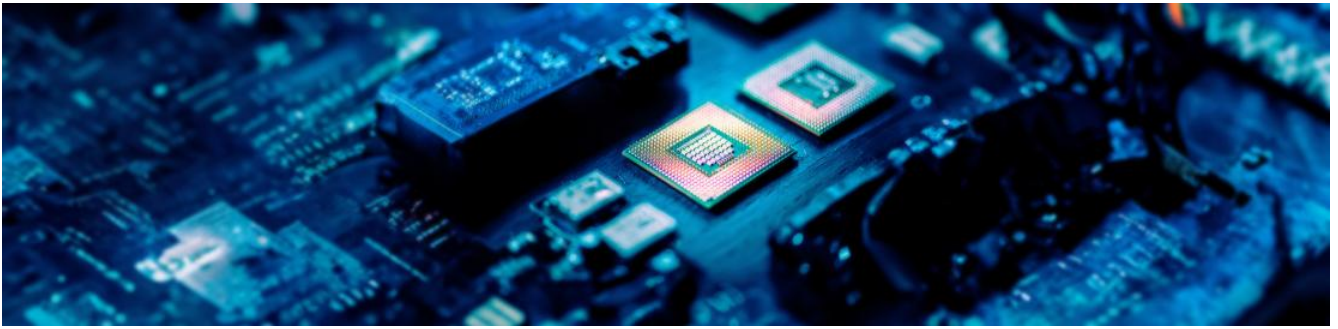




Powering tomorrow: EU invests in cutting-edge microchip tech for future AI and space applications

EU investment in the push for ever smaller and more powerful microchips is helping support innovation in AI, the space industry and beyond.

28 January 2025 - By ANTHONY KING

On 1 June 2024, a spacecraft touched down on the Moon as part of a Chinese space mission called Chang'e 6. Its goal was to study the dark side of the Moon and return lunar samples from there for the first time.

Edouard Lepape, managing director of NanoXplore, a French company that develops advanced microchips for use in the space industry, is proud of the part his company played in the mission.

To the Moon and back

“One of our components is on the Moon right now,” said Lepape. The component in question is a computer chip, a little like those used in our smartphones, cars and laptops.

Except this is a special type of chip – called a system-on-chip field-programable gate array (SoC FPGA) – widely used in the aerospace and defence industries.

Lepape is leading an EU-funded research team called DUROC that set out to advance the technology of such chips for use in space. It brings together leading experts from Germany, France, Greece and Sweden to push EU chip processor technology to the next level.

Partners in this endeavour included Airbus and Thales, Europe’s largest manufacturers of satellites.

“In space, you can’t use commercial devices because the environment is very aggressive,” said Lepape. “You have a lot of radiation, very cold temperatures and vibration.”

Space electronics must be particularly robust and work with minimal power. You cannot fix electronics on a spacecraft or satellite, nor recharge your device from mains electricity or top up on fuel.

Small in size, big in impact

A microchip is basically a set of minute electronic circuits assembled on a small, flat silicon wafer. These small electronic components serve as the “brain” of electronic devices. Their integrated circuits perform the core functions of computation and control in a system.

Since the creation of the first integrated circuit by Jack Kilby in 1959, these components have been getting increasingly smaller – and more powerful.

Composed of billions of transistors connected by circuits too small to see, microchips are crucial to everyday life. Ranging from basic chips for simple devices to highly complex chips for supercomputers, they are found in anything from smartphones and computers to advanced electronics and AI applications.

Constant advances in performance are needed to meet the demands of new high-tech devices. And when it comes to chips, every nanometre counts. The more transistors that can be fitted in the smallest space possible, the more the speed and power of the chips can be increased.

Roughly every 2 years the industry introduces a new generation of chips, containing more and smaller transistors than the previous generation. The seven nanometre (7nm) chip was introduced to the market around 2018, representing a step up from the previous generation, the 10nm node. Each step allows for improved power efficiency and performance in devices.

“Customer demand for more functionality is driving the demand for ever more and smaller transistors,” said Marc Assinck, a spokesperson at [ASML](#), a European company specialising in the design and manufacture of advanced lithography machines, which are essential tools for producing microchips. “Smartphones and AI require the latest and most advanced chips.”

His company coordinated the SeNaTe consortium, from 2015 to 2018, as part of an EU-funded research push to develop technological solutions for the adoption of 7nm microchip production technology.

“SeNaTe is significant as its results enabled the industry to progress to the next generation,” said Jos Benschop, executive vice president of technology at ASML. “The SeNaTe research led to the introduction of 7nm technology in 2019.”

Today, the industry has progressed to the even more powerful 3nm technology – currently the most advanced chips on the market, used in the latest high-end smartphones.

European non-dependence

While chips were once important for computers and laptops, and later smartphones and cars, they are now crucial for connecting devices and for AI applications.

This is an area where Europe does not want to be completely reliant on others. Although the EU has historically played a significant role in semiconductor research and development (R&D), its position in chip manufacturing has declined over the years.

Around one trillion microchips were manufactured around the world in 2020, but the EU’s share of the global market was just 10%. Asia, especially Taiwan, South Korea and China, dominates with over 70%. The US also holds a significant share due to companies like Intel and NVIDIA.

To ensure its competitiveness, the EU has launched several initiatives, including the European Chips Act, which came into force in September 2023. This aims to double Europe's global semiconductor market share to 20% by 2030 and provides €43 billion in public and private investment for chip R&D and manufacturing.

Building capacity

The EU's focus on attracting advanced microchip manufacturing facilities (fabs) to Europe is already bearing fruit.

TSMC started building its first European factory in 2024. The new European Semiconductor Manufacturing Company (ESMC) will be built in Dresden as a joint venture between the Taiwanese company and three European firms — Germany's Bosch and Infineon and the Netherlands' NXP. Production there is expected to start in 2027.

At the breaking ground ceremony for ESMC in August 2024, European Commission President Ursula von der Leyen noted that the “world's largest chipmaker coming to our continent and joining forces with three European champions is (...) an endorsement for Europe as a global innovation powerhouse”.

Negotiations are also underway with Intel for the construction of a major microchip production facility in Magdeburg, Germany, which is predicted to be the largest semiconductor production facility in Europe.

TSMC and Intel are two of the only companies in the world that can produce cutting-edge 3nm chips, along with South Korea's Samsung.

Space for change

Chips for space, however, are not the same as the chips in phones. They are tailor-made to do large amounts of data processing, such as relaying information from a camera on a satellite, while using little power. They must also be radiation-hardened and capable of continuing to function even if part of a chip is destroyed by radiation.

Right now, space chips in our satellites mostly run on 65nm and 28nm nodes. For NanoXplore and its partners in DUROC, the aim is to move space chips to the next level, which, in this field, is 7nm. Lepape foresees a bright future for these space chips, despite challenges.

“Space is a low-volume market and it is difficult to develop the most advanced nodes,” he said. “If we manage to get to 7nm, we will be a clear player in the space industry and even the US will want to have this kind of technology.” He hopes to hold such a chip in his hand in around 2027, with a first launch into space in 2027 or so.

Lepape acknowledges that Europe's position in the chip race has slipped. He believes though that ongoing cooperation and support at the EU level, including from the EU's Space R&I Work programme, will help to build the next chip designs and ensure that the EU holds its own in the chips race.

“We started to fall behind from the 2000s,” he said. “If you're not sovereign with your electronics, then for all critical technologies – including AI – you will be dependent on foreign countries.”

Research in this article was funded by the EU's Horizon Programme. The views of the interviewees don't necessarily reflect those of the European Commission. If you liked this article, please consider sharing it on social media.

More info

- [SeNaTe](#)

- [DUROC](#)
- [European Chips Act](#)
- [EU industrial research and innovation](#)
- [EU Digital, Industry and Space work programme](#)