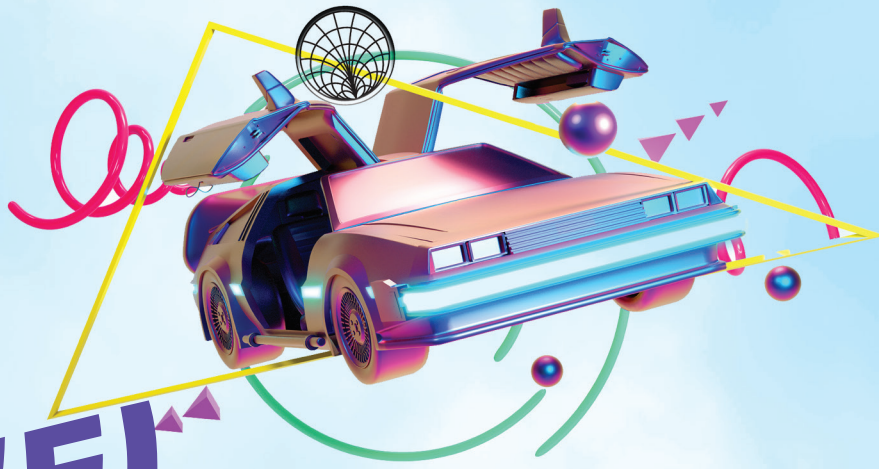

# TIME TRAVEL

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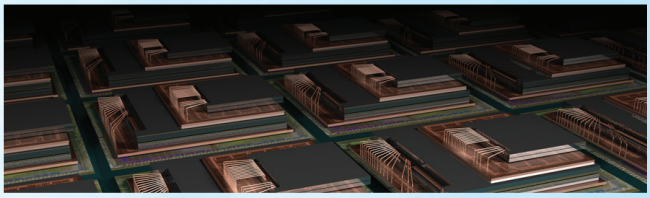
## DARPA: Born From a Surprise

The Time Travel feature has historically featured a person who was instrumental in the development of the electronics industry. As Washington, DC, prepares to host the International Microwave Symposium (IMS), we are spotlighting an agency that has been involved in much of the development of the electronics industry. Coincidentally, this agency, DARPA, was founded in February 1958, about six months before the first issue of Microwave Journal was published.

On October 4, 1957, the USSR successfully launched the first satellite into Earth orbit. The Sputnik launch came as a shock to U.S. experts and citizens who expected the U.S. would be the first to accomplish this scientific advancement. The launch also came during the Cold War era between the U.S. and the USSR and in addition to demonstrating technical superiority, it crystallized fears that the USSR could launch nuclear weapons that could reach any country in the world. In addition to kicking off the "space race," this "Sputnik surprise" triggered events that led to the formation of Advanced Research Projects Agency (ARPA). ARPA added a "D" to reflect the defense focus and contributions and became DARPA.

DARPA's stated mission is to invest in breakthrough technologies for national security. Despite a straightforward mission statement, DARPA's remit is both broad and well-funded, touching both commercial and defense applications with FY2024 funding levels expected to be slightly more than $4 billion.

The agency is credited with turning ideas about ballistic missile defense and space surveillance technologies into the reality of electronically-steered phased arrays in the early 1960s. DARPA funded the development of the first GaAs FET and then funding from the MIMIC program helped push GaAs technology from discrete devices to MMICs and helped to develop and establish the entire GaAs ecosystem from starting processes through to manufacturing and test. The significance of the "D" in DARPA's name was never more evident than with GaAs power amplifiers (PAs). Lower volume, high performance defense applications gladly used the new GaAs PAs while the supply chain evolved to the point where it could produce high yield, high performance, low-cost amplifiers that enabled the wireless revolution.



DARPA was the early driving force behind the development of GaN processes and products. Funding for this technology has produced a similar trajectory where the defense community was an early adopter of products that are widely used in commercial applications. DARPA looks to advance this technology through a program like NEXT that aims to develop nitride transistor technology to enable high speed PAs and high output DACs.

However, the interests of DARPA extend well beyond solid-state electronics and compound semiconductors. The agency claims at least some credit for developments ranging from Moderna's COVID-19 vaccine to weather satellites, GPS, drones, stealth technology, speech recognition, touchscreen displays, voice interfaces, the personal computer and the internet. A review of the DARPA website shows that their research activities come from six technical offices and they currently list 109 topics of interest. So, as we have our discussions about new products at IMS and perhaps look at old products, it is useful to remember that all the past, present and future products probably have been or will be touched by DARPA funding.