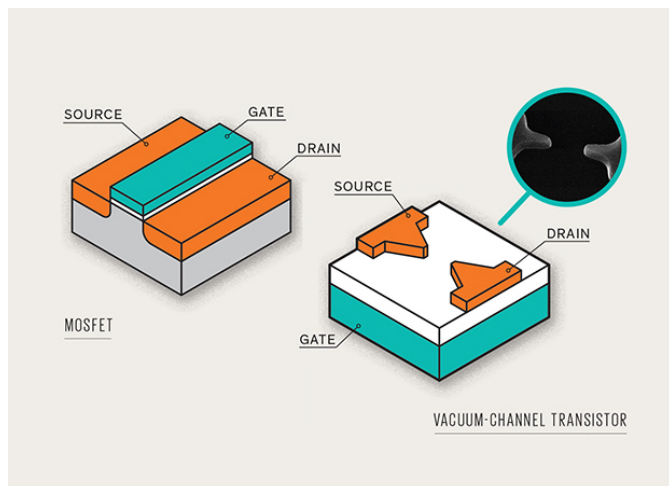


The Vacuum Tube's Nano-Scale Comeback

Written by Marco Attard
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Back in the the 1940s and 50s computers ran on vacuum tubes, but following the invention of the solid-state transistor the industry never looked back-- at least until now, as NASA researchers are swapping silicon for vacuum tubes in a so-called "vacuum-channel transistor."



The vacuum-channel transistor is, essentially, a nano-scale vacuum tube. Like conventional MOSFETs it has a source and a drain, yet instead of a gate electrode it has... nothing. Electrons from the source to the drain when current is applied to the gate via "field emission," a process allowing for faster movements of electrons.

NASA says test vacuum-channel transistors reach speeds of up to 460GHz, 10 times faster than conventional silicon transistors and comparable to the speeds of graphene transistors. It also promises to operate at the "tetraherz gap", allowing for applications such as the hazardous material detection or secure high-speed telecommunications.

The technology is still at its early days, but NASA also says it is working on production methods compatible with current CMOS fabrication, as well as voltage requirement reduction and means of cramming multiple vacuum-channel transistors on a single chip. But the researchers are positive on their chances, so who knows-- maybe vacuum tube technology will find a new use beyond audiophile-grade consumer electronics.

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