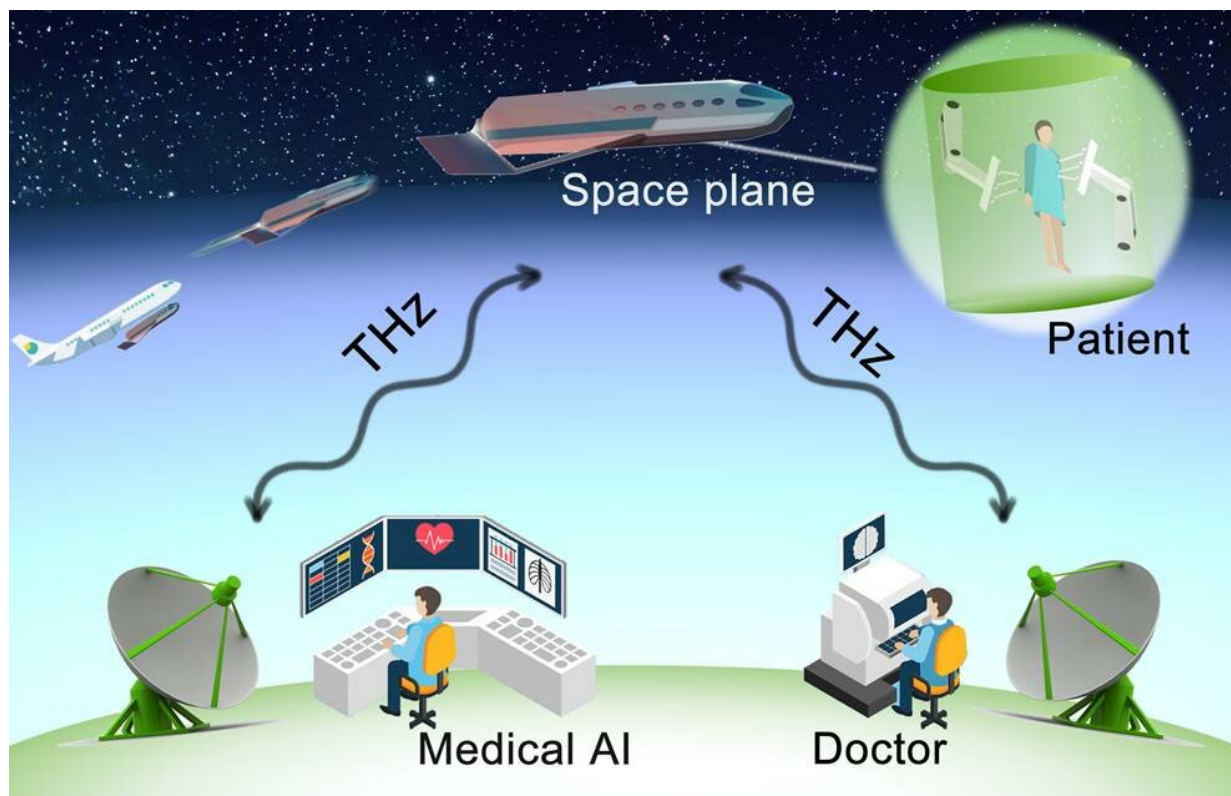


Terahertz wireless makes big strides in paving the way to technological singularity

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Medical AI and doctors at earth stations could remotely conduct a zero-gravity operation aboard a space plane connected via terahertz wireless links. Credit: Hiroshima University, NICT, Panasonic, And 123rf.Com

Hiroshima University, National Institute of Information and Communications Technology, and Panasonic Corporation announced the

successful development of a terahertz (THz) transceiver that can transmit or receive digital data at 80 gigabits per second (Gbit/s). The transceiver was implemented using silicon CMOS integrated circuit technology, which would have a great advantage for volume production. Details of the technology will be presented at the International Solid-State Circuits Conference (ISSCC) 2019 to be held from February 17 to February 21 in San Francisco, California.

The THz band is a vast new frequency domain expected to be exploited by future ultrahigh-speed wireless communications. IEEE Standard 802.15.3d, published in October 2017, defines the use of the lower THz frequency range between 252 gigahertz (GHz) and 325 GHz (the 300-GHz band) as high-speed wireless communication channels. The research group has developed a single-chip transceiver that achieves a communication speed of 80 Gbit/s using the channel 66 defined by the standard. The research group developed a 300-GHz-band transmitter chip capable of 105 Gbit/s and a receiver chip capable of 32 Gbit/s over the past few years. The group has now integrated a transmitter and a receiver into a single transceiver chip.

"We presented a CMOS transmitter that could do 105 Gbit/s in 2017, but the performance of receivers we developed were way behind for a reason. We use a technique called 'power combining' in transmitters for performance boosting, but the same technique cannot be applied to receivers. An ultrafast [transmitter](#) is useless unless an equally fast receiver is available. We have finally managed to bring CMOS receiver performance close to 100 Gbit/s," said Prof. Minoru Fujishima, Graduate School of Advanced Sciences of Matter, Hiroshima University.

"People talk a lot about technological singularity these days. The main point of interest seems to be whether artificial superintelligence will appear. But a more meaningful question to ask as an engineer is how we can keep ever-accelerating technological advancement going. That's a

prerequisite. Advances in not only computational power but also in communication speed and capacity within and between computers are vitally important. You wouldn't want to have a zero-grav operation on board a space plane without real-time connection with Earth stations staffed by medical super-AI and doctors. After all, the singularity is a self-fulfilling prophecy. It's not something some genius out there will make happen all of a sudden. It will be a distant outcome of what we develop today and tomorrow," said Prof. Fujishima.

"Of course, there still is a long way to go, but I hope we are steadily paving the way to such a day. And don't you worry you might use up your ten-gigabyte monthly quota within hours, because your monthly quota then will be in terabytes," he added.

Provided by Hiroshima University

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