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

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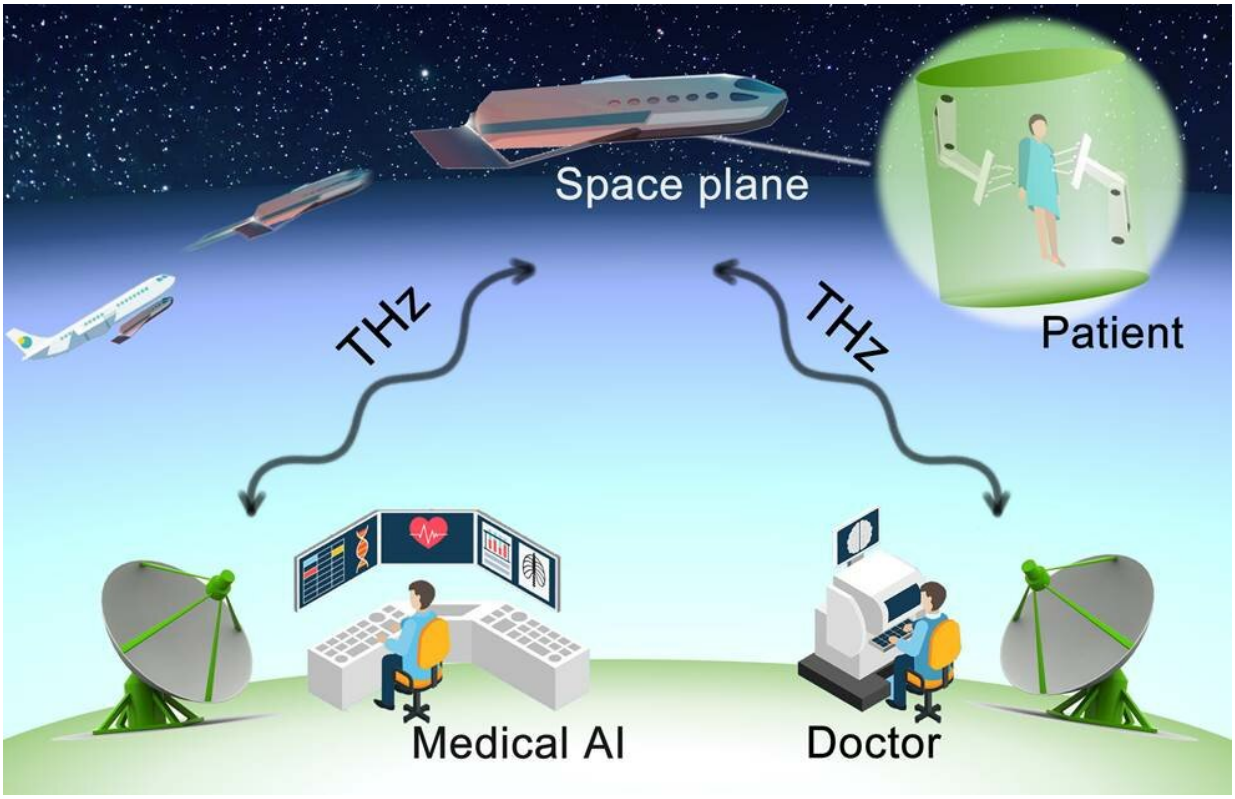

Medical AI and doctors at earth stations could remotely conduct a zero-gravity operation aboard a space plane connected via terahertz wireless links. Credit: Hiroshima University, NICT, Panasonic, And 123rf.Com

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