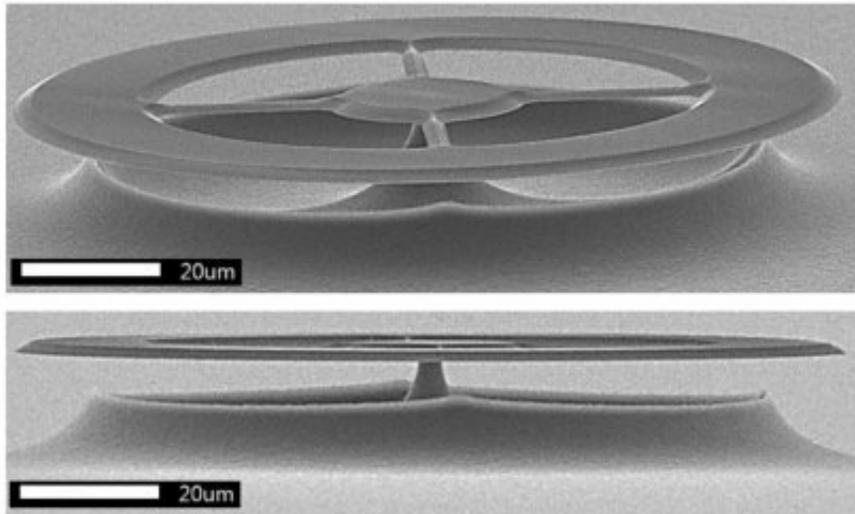


Ultra ultrasound to revolutionise technology

January 15 2019



Credit: University of Queensland

A new and extremely sensitive method of measuring ultrasound could revolutionise everything from medical devices to unmanned vehicles.

Researchers at The University of Queensland have combined modern nanofabrication and nanophotonics techniques to build the ultraprecise [ultrasound](#) sensors on a silicon chip.

Professor Warwick Bowen, from UQ's Precision Sensing Initiative and the Australian Centre for Engineered Quantum Systems, said the development could usher in a host of exciting new technologies.

"This is a major step forward, since accurate ultrasound measurement is critical for a range of applications," he said.

"Ultrasound is used for medical ultrasound, often to examine [pregnant women](#), as well as for [high resolution](#) biomedical imaging to detect tumours and other anomalies.

"It's also commonly used for spatial applications, like in the sonar imaging of underwater objects or in the navigation of unmanned aerial vehicles.

"Improving these applications requires smaller, higher precision sensors and, with this new technique, that's exactly what we've been able to develop."

The technology is so sensitive that it can hear, for the first time, the miniscule random forces from surrounding air molecules.

"We've developed a near perfect ultrasound detector, hitting the limits of what the technology is capable of achieving," Professor Bowen said.

"We're now able to measure ultrasound waves that apply tiny forces – comparable to the gravitational force on a virus – and we can do this with sensors smaller than a millimetre across."

Research leader Dr. Sahar Basiri-Esfahani, now at Swansea University, said the accuracy of the [technology](#) could change how scientists understand biology.

"We'll soon have the ability to listen to the sound emitted by living bacteria and cells," she said.

"This could fundamentally improve our understanding of how these

small biological systems function.

"A deeper understanding of these biological systems may lead to new treatments, so we're looking forward to seeing what future applications emerge."

The research is published in *Nature Communications*.

More information: Sahar Basiri-Esfahani et al. Precision ultrasound sensing on a chip, *Nature Communications* (2019). [DOI: 10.1038/s41467-018-08038-4](https://doi.org/10.1038/s41467-018-08038-4)

Provided by University of Queensland

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