

Ultrasound Imaging Probes Using CMUT Arrays (#5267)

A CMUT on CMOS chip for imaging applications

Georgia Tech Inventors have developed a capacitive micromachined ultrasonic transducer (CMUT) on a complementary metal-oxide-semiconductor (CMOS) chip for imaging applications. The CMOS chip has a CMUT array comprising of a plurality of CMUT transmit (Tx) elements; a plurality of CMUT receive (Rx) elements; and a plurality of dummy CMUT (Cx) elements. The chip utilizes arbitrarily selected transmit (Tx) and receive (Rx) element arrays to improve image quality, while reducing sampling time. The imaging chip uses direct connection to minimize external connections and chip cross-sections. The chip can also create a plurality of dummy elements dispersed throughout the Tx and Rx elements to reduce cross-talk.

Benefits/Advantages

- **Smart Structures** – CMOS architecture minimizes external connections and chip cross-section
- **Efficient** – The CMOS architecture can enable substantially the entire chip area to be utilized for element placement. The chip also utilizes direct connection to minimize external connections.
- **Increased Transmit Power** – The chip can utilize batching techniques to increase transmit power using sparse Tx arrays
- **Improved Image Quality**
- **Reduced Sampling Time**

Potential Commercial Applications

- **Ultrasound Imaging Probes** – Inspecting blood vessels or tissues around blood vessels
- **Clinical Tool** – For guiding interventions in coronary arteries, the treatment of chronic total, or near-total, vascular occlusions, and stent deployment

Background/Context for This Invention

Side-looking intravascular ultrasound (IVUS) imaging probes exist that provide relatively high resolution images of tissue and fluid. This can be useful when inspecting the inside surfaces of vessels or tissues immediately surrounding the vessel. Unfortunately, current commercial IVUS imaging systems offer only side-looking capabilities and cannot generate images of the volume in front of the catheter. An IVUS catheter that can provide forward-looking (FL) volumetric ultrasound images would be a valuable clinical tool for guiding interventions in coronary arteries, the treatment of chronic total, or near-total, vascular occlusions, and for stent deployment.

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More Information

Publications

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/ultrasound-imaging-probes-using-cmut-arrays>

Images: