Richard P. Feynman Center for Innovation

Technology Snapshot

Technology Licensing Opportunities

Los Alamos NATIONAL LABORATORY

Plane-Wave Platform

Ultrasound Tomography for Cancer Imaging

Value Proposition

Plane-wave ultrasound tomography from Los Alamos National Laboratory is a next-generation imaging platform designed to improve how tissue properties are reconstructed from ultrasound data, with a focus on detecting and characterizing prostate and breast cancer. The related invention disclosures describe a broader ultrasound toolkit that includes ultrasound waveform tomography/inversion, efficiency improvements and super-resolution imaging methods, creating a platform that can deliver more informative imaging while remaining practical for screening, diagnosis and treatment monitoring.

Technology Readiness Level 5

IP Information | S-133625

U.S. Patent Nos. 9,955,943; 9,955,944; 10,028,728; 11,344,283; 10,034,656; 10,231,707; 11,284,858

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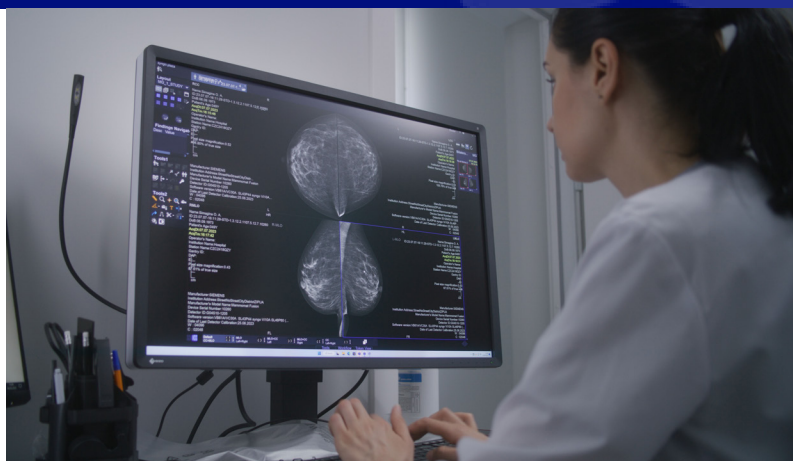
The Challenge

Early cancer detection depends on imaging methods that can reliably distinguish suspicious tissue from healthy tissue, yet the disclosures note that effective imaging for dependable cancer detection and characterization remains limited. Current clinical ultrasound can be useful, but they often limited in their ability to provide sufficient detail about tissue



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properties, and they can be constrained by image resolution and quality. The inventors addressed a critical clinical need for ultrasound imaging that can perform more than generating an image—they need to help characterize the nature of the tissue itself.

Problems Solved

The plane-wave tomography platform addresses these limitations by reconstructing tissue properties from plane-wave ultrasound data, rather than relying only on conventional image formation. These technologies also describe methods that improve reconstruction speed, stability, and resolution, including wave-energy-based preconditioning, spatial and edge regularization, and super-resolution TR-MUSIC techniques. Together, the technology bundle is intended to produce more accurate, higher-quality, and quantitative imaging that can better support cancer detection and characterization.

The broader problem solved by the Plane-Wave platform is the gap between conventional ultrasound imaging and clinically useful tissue characterization. Prostate and breast cancer detection benefit from imaging that is more sensitive to changes in tissue physical properties and more robust across different scanning conditions. These methods are designed to help imaging systems deliver more consistent results, improve diagnostic confidence, and extend the value of ultrasound into areas where existing methods may not provide sufficient information.

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NNSA National Nuclear Security Administration

Advantages

- Better tissue characterization than standard ultrasound
- Can use transmission data, reflection data, or both
- Supports prostate cancer and breast cancer applications, in addition to other diseases
- Aims to improve image quality and resolution while providing additional tissue-property information
- Helps with screening, diagnosis and treatment monitoring
- Includes related methods that improve reconstruction stability and efficiency

Market Applications

- **Medical and Diagnostic Imaging** (ultrasound systems for hospitals and imaging centers, tissue characterization and lesion assessment)
- **Cancer Screening** (prostate and breast cancer detection programs)
- **Treatment Monitoring** (tracking response during therapy)
- **Women's Health** (breast imaging and follow-up evaluation)
- **Urology** (prostate imaging and assessment)

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