



Surface Identification Using Microwave Signals for Microwave-Based Detection of Cancer

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WARF: P04338US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an algorithm that provides an estimate of the location of the breast surface, which is needed to account for propagation effects in high-performance lesion detection and imaging algorithms.

Overview

UW-Madison researchers previously developed a novel imaging technique for detecting breast cancer (see WARF reference number P01386US). This technique makes use of the sharp contrast in dielectric properties between breast carcinomas and normal tissue at microwave frequencies. Like most microwave-based breast imaging algorithms, it relies upon knowledge of the location of the breast surface relative to the transmitting and receiving antennas; however, this location is unknown a priori and varies from patient to patient.

The Invention

UW-Madison researchers have now developed a data-adaptive algorithm that uses reflected microwave signals to estimate the location of the skin-breast interface relative to the antenna locations. This approach is based on geometric principles and the fact that the impedance mismatch at the skin-breast interface results in significant backscatter.

First, a matched filter is applied to the backscattered signal in each antenna channel to determine the propagation time from the antenna to the skin-breast interface. The propagation time locates the interface on a circle with a known radius. The breast surface is assumed to be convex and tangent to the circle. A tangent point, which defines the intersection of the circle and breast surface, is determined for each antenna by assuming that the circles centered at adjacent antennas intersect the same tangent line. The resulting set of tangent points from the antenna locations is fit with a curve, which defines the breast-skin interface.

Applications

- Breast cancer detection

Key Benefits

- Provides an estimate of the location of the breast surface, which is needed to account for propagation effects in high-performance lesion detection and imaging algorithms
- Works with the imaging technique described in WARF reference number P01386US

Additional Information

For More Information About the Inventors
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Related Technologies

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- [See WARF reference number P01386US for a microwave-based breast imaging technique.](#)
- [See WARF reference number P04337US for a microwave-based breast cancer detection method that incorporates hypothesis testing.](#)

Tech Fields

- [Medical Imaging : Other diagnostic imaging](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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