

# Performance Comparison of Early Breast Cancer Detection Precision Using AI and Ultra-wideband (UWB) Bio-Antennas

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## Abstract:

Breast cancer is the most common cancer among women and a major cause of death globally. A high percentage of the cancer death can be reduced if it is detected earlier (Stage 1 or 2). Early and non-invasive (health-friendly) diagnosis is the most essential key to detect breast cancer that ensures a fast and effective treatment for reducing women mortality. Ultra-wide band (UWB) technology is considered as an effective technique for breast cancer detection due to its health friendly (non-ionizing) nature to human tissue. The UWB technology uses the scattering or reflected wave/signal from breast tissue for diagnosis. A high-performance bio-antenna plays an important role in transmitting and receiving the UWB signal for this case. In this paper, breast cancer detection performance comparison of two types of UWB bio-antennas (pyramidal shaped UWB patch and the proposed modified T shaped UWB patch) has been investigated depending on accuracy. A system has been developed using a pair of UWB transceivers with bio-antennas and artificial neural network (ANN). The signals are transmitted and received through breast phantom for different arbitrary tumor size and location for considered antennas. The obtained tumor/cancer location and size detection accuracy are approximately 90.27% and 89.91 % for pyramidal shaped antenna, whereas, those for the proposed (modified T shaped) antenna are nearly 91.03% and 91.09% respectively. The proposed (modified T shaped) antenna is comparatively better to detect early breast cancer than pyramidal shaped antenna, by showing its suitability for practical use in near future.

**Keywords:** Breast Cancer Early Detection; Bio-antenna; Ultra-Wideband (UWB); Artificial Neural Network (ANN).

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