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Researchers in Hyderabad explore microwave-based technology for early detection of breast cancer

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Novel antenna design could enable non-invasive sensing of tissue abnormalities



NR Vignana Jyothi Institute of Engineering and Technology (VNR VJIET), Hyderabad, has published a patent for a novel microstrip patch antenna-based design aimed at enabling the non-invasive detection of skin and breast cancer at an early stage.

The research focuses on a specially designed microstrip patch antenna that uses electromagnetic waves to study differences in the properties of healthy and potentially malignant tissue. The research patent has been published and is currently at the simulation stage, with the research team working towards further validation and eventual prototype development.

The approach is being explored in response to the continuing need for simpler, accessible and cost-effective methods of detecting cancer at an early stage. Unlike conventional diagnostic approaches that may involve imaging, tissue sampling or invasive procedures, the proposed technology is designed to sense variations in tissue characteristics without cutting, inserting or penetrating an instrument into the body.

The technology uses a specially designed microstrip patch antenna to transmit electromagnetic energy towards biological tissue. Healthy and abnormal tissues can differ in their dielectric properties and conductivity. When electromagnetic energy interacts with these tissues, a portion of the energy is absorbed or scattered, while the remaining energy is reflected towards the antenna. These variations can influence the reflected electromagnetic signal.

By analysing these changes, the researchers are studying how the technology can help distinguish normal tissue from abnormal or potentially malignant tissue.

The research is currently in its early stage with simulation effort; further fabrication, testing and clinical validation would be necessary to establish its effectiveness as a diagnostic technology.