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IIT-M develops ultrasound based temperature tracking for treatment monitoring

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Researchers of the Indian Institute of Technology, Madras (IIT-M) have developed an Ultrasound-based temperature tracking for treatment monitoring. Unlike other imaging modalities, ultrasound combines several advantages such as safety (non-ionising), real-time capability and portability, among others.

This solution involves obtaining diagnostic ultrasound signals from the tissue region of interest inside the body, where heating is applied non-invasively from outside either through microwave applicator or High-intensity Focused ultrasound (HIFU), and process these signals, specifically, using prior knowledge from physics of wave interaction with the tissue medium.

The Practical Benefits of this technology in the healthcare field include:

- Non-invasive treatment and real-time monitoring of the process
- Safe to use as no exposure to ionising radiation is involved
- Portable and suitable for point-of-care applications
- The ultrasound-based real-time feedback can be readily integrated with low-intensity ultrasound heat therapy devices that are commonly used in most physiotherapy centres

The IIT-M Researchers' contribution is to monitor this in real-time when, specifically, microwave is used. This combination makes it completely non-invasive and affordable.

Prof Arun K Thittai, Department of Applied Mechanics, IIT Madras, said, “Having multi-parametric image feedback allows for accurate real-time monitoring for a wide range of thermal therapies. These techniques can be incorporated as a software in existing scanners by the manufacturers and thus does not require any special electronics hardware.”

Currently, the IIT-M researchers have demonstrated the feasibility of the methods using experiments done on tissue mimicking phantoms and ex-vivo tissue samples.

The Research Team involves faculty from the Department of Engineering Design at IIT-M for the microwave applicator aspect.

This research has been undertaken at the biomedical ultrasound laboratory at IIT-M.