

SOLUS Project: Innovation in Breast Cancer Detection



Scientists and engineers are developing an innovative, multimodal tomographic system to improve the diagnosis of breast cancer as part of the SOLUS project (Smart Optical and UltraSound diagnostics of breast cancer). The system combines optical methods, a smart optode performing diffuse optical tomography, and conventional ultrasound imaging but also advanced quantitative elastography.

See Also: [Study: MRI as Supplemental Breast Cancer Screening Tool](#)

The multimodal imaging system will be able to classify breast lesions detected by mammography screening in a non-invasive manner, making it easier for clinicians to differentiate between benign and malignant lesions. Improved characterisation of lesions is likely to reduce rates of invasive investigations such as biopsies, which are currently carried out in an unnecessarily high number of cases.

The SOLUS system will produce a global multi-parametric classification of breast lesions, where all parameters related to the degree of malignancy of breast lesions will be evaluated simultaneously:

- Ultrasound imaging, currently used for clinical diagnosis, will provide anatomical information.
- Elastography will estimate the stiffness of the tissue, which tends to be higher in malignant tumours.
- Optical tomography will assess tissue composition. It measures water, lipid and collagen content, as well as functional blood parameters such as blood volume and oxygenation levels. Additionally, characteristic quantities of the light diffusion in tissue provide information on its microscopic structure.

Several components developed by the project for the SOLUS system will also have potential applications in other fields, ranging from wearable devices to monitor muscular oxygenation or the threshold for the formation of lactate during sports training and medical rehabilitation to non-destructive assessment of the quality of fruit and vegetables.

SOLUS is coordinated by Politecnico di Milano (Prof. Paola Taroni, Department of Physics) and relies on a multidisciplinary consortium bringing together engineers, physicists and radiologists from nine partners from industry, academia and the clinical field. The European Institute for Biomedical Imaging Research, EIBIR, supports the management of the projects and leads the dissemination activities.

Source: [European Institute for Biomedical Imaging Research](#)
Image Credit: EIBIR

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