

Ultra wide Band (UWB) Based Early Breast Cancer Detection using Artificial Intelligence

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Abstract. Breast cancer is a silent killer malady among women community all over the world. The death rate is increased as it has no syndrome at early stage. There is no remedy; hence, detection at the early stage is crucial. Usually, women do not go to clinic/hospital for regular breast health checkup unless they are sick. This is due to long queue and waiting time in hospital, high cost, people's busy schedule, and so on. Recently, several research works has been done on early breast cancer detection using Ultra Wide Band (UWB) technology because of its non-invasive and health-friendly nature. Each proposed UWB system has its own limitation including system complexity, expensive, expert operable in clinic. To overcome these problems, a system is required which should be simple, cost-effective and user-friendly. This chapter presents the development of a user friendly and affordable UWB system for early breast cancer detection utilizing Artificial Neural Network (ANN). A feed-forward back propagation Neural Network (NN) with 'feedforwardnet' function is utilized to detect the cancer existence, size as well as location in 3-dimension (3D). The hardware incorporates UWB transceiver and a pair of pyramidal shaped patch antenna to transmit and receive the UWB signals. The extracted features from the received signals have been fed into the NN module to train, validate, and test. The average system's performance efficiency in terms of tumor/cancer existence, size and location are approximately 100%, 92.43% and 91.31 % respectively. Here, in our system, use of 'feedforwardnet' function; detection-combination of tumor/cancer existence, size and location in 3D along with improved performance is a new addition compared to other related researches and/or existing systems. This may become as a promising user-friendly system in near future for early breast cancer detection in domestic environment with low cost and to save precious life.

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