Beam forming for adaptive antennas

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Adaptive antenna arrays at the base station of mobile communication systems can locate and track users and can dynamically adjust the radiation pattern to enhance the quality of reception while increasing the capacity of the system. It is a smart antenna that can detect the direction of arrival of a desired signal and form the antenna beam towards the user and form a null towards the interferer. This paper presents the results of a computer simulation of a neural network based beamforming carried out with one user and one interferer, when the directions of arrival are known.

A Generalised Regression Neural Network was for the simulation. The network consists of 2-layers of neurons between the inputs and the output. The inputs were the directions of arrival of a desired signal and an interfering signal. The output is the phase difference required for the feeding circuit of a linear phased array. the network was trained using a data set determined theoretically.

The trained network was used to determine the phase angles, which in turn was used to draw the radiation pattern that showed the desired beamforming. Simulation was carried out with a variet of inputs. For a 10-element array the rms error of the major lobe direction for a given direction of arrival of a signal was 3.11^o and the rms error of the direction of the null for a given interfering signal was 2.55^o. The results are promising.