# Blind Channel Estimation of OFDM System by Relying on the Gaussian Assumption of the Input

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**Abstract**

Orthogonal Frequency Division Multiplexing (OFDM) modulation is a technique that has attracted considerable attention as it combines the advantages of high achievable data rates, relatively easy implementation, high spectral efficiency and robustness to multipath fading. However, to recover the transmitted data, the receiver requires an estimate of the channel. Most channel estimation methods rely on some form of training which reduces the useful data rate. Here instead we blindly estimate the channel by maximizing the log likelihood of the channel given the output data. Finding the likelihood function of a linear system can be very difficult. However, in the OFDM case, central limit arguments can be used to argue that the time-domain input is Gaussian. This together with the Gaussian assumption on the noise makes the output data Gaussian and the likelihood expression of the output can be written easily. The likelihood function can then be maximized to obtain the ML estimate of the channel. Unfortunately, the likelihood function is not unimodal and thus finding the global maxima might be challenging. We propose to find the global maxima of the ML objective function using two methods. One is the Steepest descent method which involves complex matrix differentiation and the other is the Genetic Algorithm. We will also explore various techniques to reduce the computational complexity of these two algorithms. The project will have duration of 11 months at a cost of SR. 53,600.