MVJ College of Engineering, Department of Medical Electronics Engineering organized a guest lecture on "Applied Digital Signal Processing" presided over by **Mr. Muralidharan, Vice President at MaxEye technologies** on 24th March 2017 in MVJCE campus**.** The event was attended by the faculty and students of Medical Electronics department.

His itinerary for the day was as follows:

1. Probability, Variance, Mean and Standard Deviation
2. Autocorrelation
3. Power Spectrum Density
4. Pre-clinical and clinical procedures
5. Additive White Gaussian Noise
6. Fourier Series
7. Least Mean Square Algorithm
8. Demo on Echo cancellation in Matlab

He opened the session by defining Probability. Next, he spoke different mean, variance, correlation functions, filters (IIR and FIR), Additive White Gaussian Noise, Power Spectral Density, Eigen Function and Least Mean Square algorithm.

Probability is the extent to which an event is likely to occur, measured by the ratio of the favorable cases to the whole number of cases possible.

If a variable can take on any value between two specified values, it is called a continuous variable; otherwise, it is called a discrete variable.

Probability Density Function (PDF): a function of a continuous random variable, whose integral across an interval gives the probability that the value of the variable lies within the same interval.

Autocorrelation, also known as serial correlation, is the correlation of a signal with a delayed copy of itself as a function of delay. Cross-correlation is a measure of similarity of two series as a function of the displacement of one relative to the other.

Power Spectral Density (PSD) is the frequency response of a random or periodic signal. It tells us where the average power is distributed as a function of frequency.

Additive white Gaussian noise (AWGN) is a basic noise model used in Information theory to mimic the effect of many random processes that occur in nature. The modifiers denote specific characteristics: Additive because it is added to any noise that might be intrinsic to the information system.

Eigen Function each of a set of independent functions which are the solutions to a given differential equation.

Fourier Series is an infinite series of trigonometric functions which represents an expansion or approximation of a periodic function, used in Fourier analysis.

In order to preserve the full information in the signal, it is necessary to sample at twice the maximum frequency of the signal.

In signal processing, a finite impulse response (FIR) filter is a filter whose impulse response (or response to any finite length input) is of finite duration, because it settles to zero in finite time. IIR filters are digital filters with infinite impulse response. Unlike FIR filters, they have the feedback (a recursive part of a filter) and are known as recursive digital filters therefore.

An adaptive filter is a system with a linear filter that has a transfer function controlled by variable parameters and a means to adjust those parameters according to an optimization algorithm. Because of the complexity of the optimization algorithms, almost all adaptive filters are digital filters.

Least mean squares (LMS) algorithms are a class of adaptive filter used to mimic a desired filter by finding the filter coefficients that relate to producing the least mean square of the error signal (difference between the desired and the actual signal). It is a stochastic gradient descent method in that the filter is only adapted based on the error at the current time.

FILTERING MATERNAL AND FETAL ELECTROCARDIOGRAM (ECG) SIGNALS USING LMS ALGORITHM