NON-LINEAR DYNAMICAL ANALYSIS OF BIOSIGNALS, Anupkumar Patil, MSc Bioengineering.

Biosignals are physiological signals that are recorded from various parts of the body. Some of the major biosignals are ECG's, EMG's, and EEG's. These signals are of great clinical and diagnostic importance, and are analysed to understand their behaviour and to extract maximum information from them. However, they tend to be random and unpredictable in nature (non-linear). Conventional linear methods of analysis are insufficient. Hence, analysis using non-linear and dynamical system theory, chaos theory and fractal dimensions, is proving to be very beneficial[1].

This project primarily aims to understand the unpredictable behaviour of these biosignals by applying the concepts of the above non-linear techniques to extract maximum information. The major objective of the project is to develop a model for monitoring and analysis of biosignals for early prediction and diagnosis of dynamic diseases. The MATLAB™ package will be used to develop algorithms and to analyse the raw data. The Graphical User Interface (GUI) toolbox available in MATLAB will be exploited to develop a user friendly GUI. The GUI will enable various processing parameters to be selected and for data to be analysed accordingly.

A variety of appropriate data is available on the Physionet database[2] for the initial testing and development of algorithms. Additional data and clinical expertise will be provided by Glasgow Royal Infirmary during the latter part of project development.

References:-
1) Donahue, Manus J. III; *"An Introduction to Mathematical Chaos Theory and Fractal Geometry"*; Fall 1997
2) http://www.physionet.com

Acronyms
ECG   Electrocardiogram
EMG   Electromyogram
EEG   Electroencephelogram
GUI   Graphical User Interface