International Journal of Advance Research in Science and Engineering
Volume No.06, Issue No. 11, November 2017
www.ijarse.com
IJARSE
ISSN: 2319-8354

A CRITICAL REVIEW ON APPLICATION OF BIOMEDICAL SIGNAL PROCESSING IN MEDICINE

Dr.L.Latchu[1], Dr.N.Aruna Kumari[2],
Kanakam Yamini Sushma Murali Priya[3],
Mathamsetty Jaya Lakshmi[4], Garapati Anjali Devi[5]

[1]Assoc.Prof.,Gandhi Medical College, Secunderabad
[2]Assoc.Prof of Engineering Chemistry, GIET(A) Rajahmundry
[3,4,5]B.Tech Electronics and Communication Engineering, GIET(A) Rajahmundry

ABSTRACT

Biomedical signal processing provides an introduction to terminology and basic ideas for testing for randomness and trend, and for the determination of basic signal properties in the time domain, given the uncertainties associated with the estimation process. Techniques outlined in the paper are : the coherent average, cross-correlation and covariance , autocorrelation and phase-shift averaging. Biomedical signals are observations of physiological activities of organisms, ranging from gene and protein sequences, to neural and cardiac rhythms, to tissue and organ images. Biomedical signal processing aims at extracting significant information from biomedical signals. With the aid of biomedical signal processing, biologists can discover new biology and physicians can monitor distinct illnesses. Decades ago, the primary focus of biomedical signal processing was on filtering signals to remove noise. Sources of noise arise from imprecision of instruments to interference of power lines. Other sources are due to the biological systems themselves under study. Organisms are complex systems whose subsystems interact, so the measured signals of a biological subsystem usually contain the signals of other subsystems. Removing unwanted signal components can then underlie subsequent biomedicine discoveries.

Key Words: Medical instruments, Bio medical Engineering, Bio medical instruments, Bio medical Signal Processing, Electronics

I.BIOMEDICAL SIGNAL PROCESSING

Human bodies are constantly communicating information about our health. This information can be captured through physiological instruments that measure heart rate, blood pressure, oxygen saturation levels, blood glucose, nerve conduction, brain activity and so forth. Traditionally, such measurements are taken at specific points in time and noted on a patient’s chart. Physicians actually see less than one percent of these values as they make their rounds—and treatment decisions are made based upon these isolated readings.

International Journal of Advance Research in Science and Engineering
Volume No.06, Issue No. 11, November 2017
www.ijarse.com
IJARSE
ISSN: 2319-8354

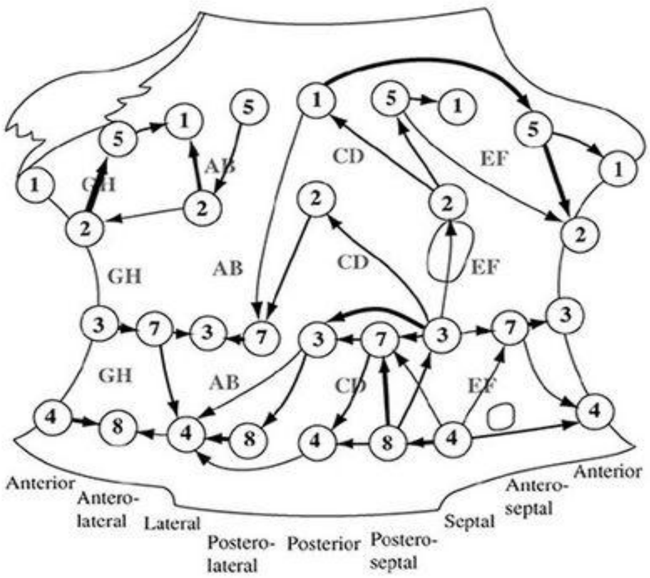
Biomedical signal processing involves the analysis of these measurements to provide useful information upon which clinicians can make decisions. Engineers are discovering new ways to process these signals using a variety of mathematical formulae and algorithms. Working with traditional bio-measurement tools, the signals can be computed by software to provide physicians with real-time data and greater insights to aid in clinical assessments. By using more sophisticated means to analyze what our bodies are saying, we can potentially determine the state of a patient's health through more noninvasive measures.

Patient › Signals › Processing › Decision

Research in biomedical signal processing is pursued in the areas of electro cardiology, dialysis, eye-tracking, and neuro engineering. This paper reviews the aspects such as modeling, simulation, processing and interpretation to better understand properties of physiological systems. Special emphasis is put on addressing issues related to a trial fibrillation,

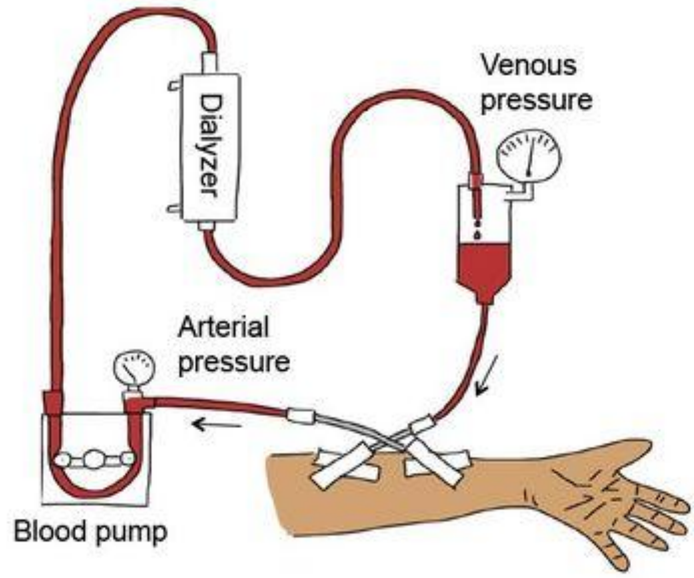
II. ELECTROCARDIOLOGY

The electrocardiology research is since the 90'ies. The major contributions to this field concerns development of signal processing tools for modeling, analysis, and understanding of the heart's electrical activity during atrial fibrillation. Atrial fibrillation is the most commonly encountered in clinical practice and its complex and metamorph.



Novel Monitoring Techniques for Safer Hemodialysis Treatment

The goal of this paper is to develop a critic review on the methods which extend the functionality of current hemo dialysis technology so that physiological activity can be monitored and intra dialytic hypotension reliably predicted. Preferably, the method should not require any extra sensor that causes discomfort to the patient. In this paper, review has been done on the extra corporeal pressure signal, which plays an important role since it may be explored for deriving different types of physiological information that reflect cardiac activity and respiration. The performance of the developed methods is evaluated in technical terms by comparing the information extracted from derived signals and gold standard signals, as well as in clinical terms by assessing performance on hypotension prediction. A project has been done on this along with the collaboration of Gambro Lundia AB established many years ago.

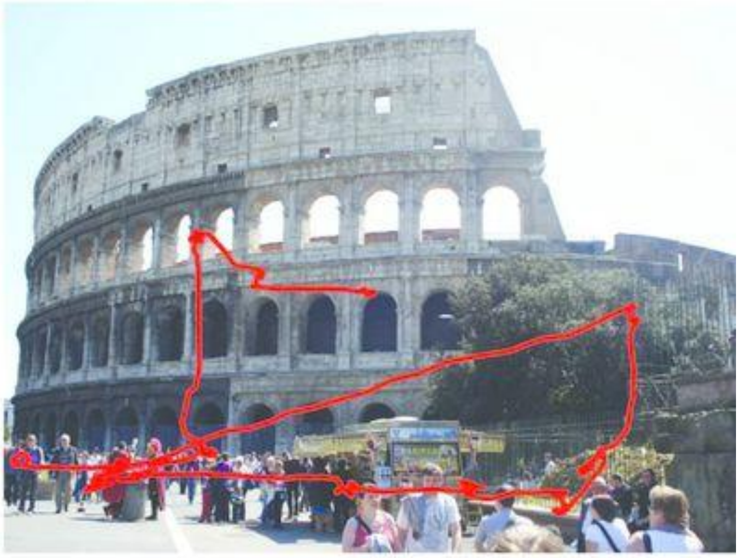


The extracorporeal blood circuit of a hemodialysis machine.

III. EYE-TRACKING

Eye-tracking is a technique to estimate where a person is looking. In many research fields, the eye-tracker is used as a tool to investigate different kinds of eye movements and their relationships to the underlying processes in the brain. Examples where eye-tracking are used are: reading, perception of images, decision making, medicine etc. In this project the main focus is to develop algorithms for detection and classification of different types of eye movements in signals recorded with an eye-tracker.

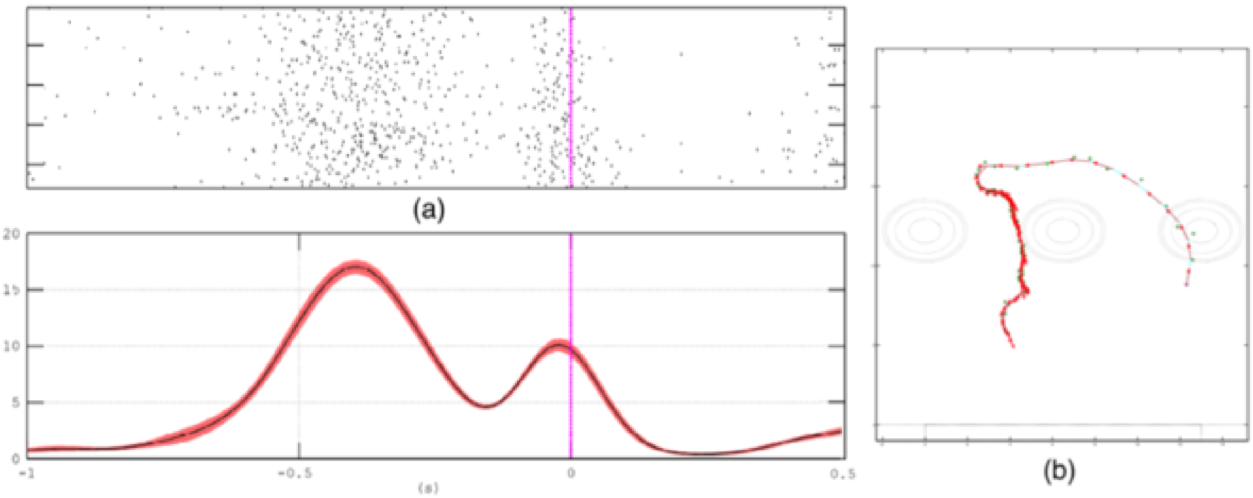
International Journal of Advance Research in Science and Engineering
Volume No.06, Issue No. 11, November 2017
www.ijarse.com
IJARSE
ISSN: 2319-8354



Neuroengineering

IV. NEURAL ENCODING OF REACHING

In this paper, the authors reviewed the development of signal processing methods that facilitate the understanding of local neural information in control of movements, in particular the *reaching* task. This is done by simultaneous analysis of neural activity (within and between brain structures) and recorded movement trajectories during normal reach. The intention is to perform the same studies during certain diseases such as Parkinson's disease, aiming for better understanding of the underlying pathophysiological mechanisms causing motor dysfunction.



(a) Single unit neural activity within motor cortex, (b) movement trajectories during a reach task.

V.BIOMEDICAL SIGNAL PROCESSING & INSTRUMENTATION

Signal processing and machine learning applied to medical signals and data is the main focus of the Biomedical Signal Processing. There is a need to be focused on machine learning and data fusion for early warning of patient deterioration in hospital, as well as m-health for self-management of chronic diseases such as diabetes. Focuses on (i) very-large scale data fusion, from genomics to patient-worn sensors, and (ii) extensions for affordable health care in developing countries. (iii) tensor decompositions in biomedical applications and (iv) neuroscience and mental health monitoring are also needed by the day by day growing medical needs of the society.

REFERENCES

[1.] *CHALLIS,R.E. and KITNEY,R.I(1982)the design of digital filters for biomedical signal processing(in three parts).Part1.j.Biomed.Eng.,4,267-278.*

[2.] CHALLIS,R.E. and KITNEY,R.I(1938a)the design of digital filters for biomedical signal processing(in three parts).Part2.5,19-30.

[3.] CHALLIS,R.E. and KITNEY,R.I(1983b)the design of digital filters for biomedical signal processing(in three parts).Part 3.,5,91-102.

[4.] CHATFIELD,C.(1984)The analysis of time series:an introduction,3rd edn,Chapman & Hall,London.

[5.] HOEL,P.G.(1971)Introduction to mathematical statistics,4h edn.John Wiley,New York.

[6.] KENDALL,Sir M.(1976)Time series,2nd edn.Charles Griffin.