Engmednews

Editorial

Dear BMESI Members

Seasons Greetings !

Medical device market is continuously growing in India. All the device manufacturers focus on at least one of the attributes such as accessibility, quality and affordability or all of them. Safety , Reliability and Efficacy are the key components of any medical device. Over 10000 unidentified local manufactures must gear up to practice quality standards and regulatory requirements to grow and sustain their business. That means huge opportunities are available in medical device sector in India.

Dear readers, this issue includes new column for snippets and students corner. Also, on behalf of BMESI, I congratulate professor K M Ravikumar who received PhD award for his thesis on "Speech analysis for Objective Assessment of Early Stuttering." New products and upcoming events are regular features in this issue.

Have a happy reading and enjoy the day!!!

Regards

Bheemsain Rao

Inside this Issue
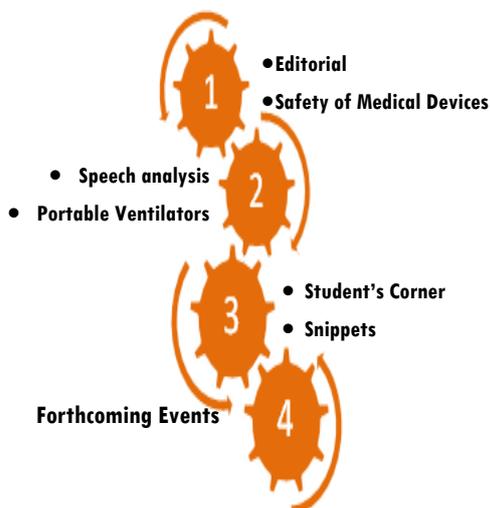
Regulation of Safety of Medical Devices in India

The modern day healthcare system heavily relies on a range of diagnostic, therapeutic and analytical equipment for delivery of safe and effective care to the patients.

India's market for medical devices is in the world's top twenty and is expected to grow at feverish pace. Even with increasing presence of local medical device manufacturers, we still import more than half of all healthcare equipment, in particular high technology products. Among those locally manufactured devices most are not regulated to ensure standards, efficacy, safety and reliability aspects. In addition India lacks appropriately trained personnel to ensure functional performance and safety of these equipments through periodic testing.

A draft bill for regulation of medical devices was put forward in 2006 and amendments suggested in 2008, but its implementation process is still unclear.

The MoHFW (Ministry of Health and Family Welfare) and the DST have been debating for over five years regarding the legislation governing the regulation of medical devices with limited results.

Despite Govt. of India's reasonable, good faith effort, there remains significant uncertainties and concerns about the direction and pace of India's attempt to regulate medical technologies, as well as the structure of India's planned regulatory authority.

- Supriya Babu

Speech analysis for Objective Assessment of Early Stuttering

Dr. Ravikumar K.M., HoD Information Science & Engg., Ghousia College of Engg, awarded PhD for thesis on "Analysis of Stuttered Speech for Objective Assessment of Early Stuttering"

Oxylog® 3000 plus : A high-quality therapy with a full range of pressure and volume controlled ventilation modes combined with NIV, pressure support, incremental O₂ concentration regulation and apnea ventilation

Stuttering is a communication disorder characterized by certain types of disfluencies, such as sound/syllable repetitions, which are frequent enough to be disruptive. A few novel approaches to automate the counts of speech have been proposed thus providing an objective and consistent measurement.

Approach 1 is based on Hidden Markov Models. In this approach the designed system is able to give the output in terms of uttered phonemes, the recognition of repetition of group of phonemes as repetition disfluency.

In approach II, procedure for automatic detection of syllable repetition is considered. This approach has four Stages comprising of Segmentation, Feature extraction, score matching and decision logic. Here automatic segmentation is done manually. Feature extraction is implemented by well known 12 dimensional Mel Frequency Cepstral Coefficient (MFCC). MFCC obtained for each segment is compared with the adjacent one and scores are obtained. Score matching is done using Dynamic Programming procedure -

-which combines alignment and distance computation (Dynamic Time Warping). The decision logic is implemented using Perceptron and also with support Vector Method. As the number of Iterations is Very important parameter in assessing the severity of stuttering, the approach III provides the algorithm for its computation. The Bayesian Classifier is also tested for its accuracy to separate the fluent and disfluent.

In this study approach II provides better results. 100% accuracy is obtained when simulated data and 93.5% with test data. To compute the severity of stuttering, approach III gives the procedure and 100% accuracy was obtained with simulated data, where as in test data it is 83.625%. In all these 3 approaches, 80% of the data were used for training and 20% data for testing.

- Dr. Ravikumar K. M., <kmravikumar@rediffmail.com>

Portable Ventilators

Oxylog® 3000 plus from Dräger Medical GmbH

Patients are most vulnerable during transport. Maintaining the highest possible standard of ventilation at all times, even during transport, can mean the difference between success and setback. So Dräger, took on the challenge and raised the bar in transport ventilation. Drawing on over a century of experience in the field of mechanical ventilation, they created a device that gives state-of-the-art ventilation in a compact and rugged format that is simple and intuitive to operate.

Tested for use in fixed and rotary wing aircraft, the Oxylog 3000 plus features BTPS and automatic altitude compensation to adjust tidal volumes during flight. It's also a perfect choice for any ground-based medical transport vehicle or hospital emergency department. Its design in-

corporates a simple but effective mounting system for safe, hands-free operation. Its powerful battery can provide approximately 4 hours of independent operation.

This device provides a high-quality therapy with a full range of pressure and volume controlled ventilation modes combined with NIV, pressure support, incremental O₂ concentration regulation and apnea ventilation. The device also features improved safety during transport by using AutoFlow to minimize peak airway pressures and integrated capnography to check intubation.

Additionally the device also displays realtime ventilation data on external monitors and has a wide range of standardized accessories that facilitate user proficiency and help streamline inventory management.

www.draeger.com

Students' Corner: QRS PEAK DETECTION

The electrocardiogram (ECG) provides a physician with a view of the heart's activity through electrical signals generated during the cardiac cycle, and measured with external electrodes. Its clinical importance in cardiology is well established. The QRS complex is the central and most visually obvious part of the ECG tracing. It corresponds to the depolarization of the right and the left ventricles. The QRS complex is 80-120 ms in duration.

We have developed a code in MATLAB® to detect the QRS complexes of ECG signals using the Pan-Tompkins algorithm. This code reliably recognizes QRS complexes based upon digital analysis of slope, amplitude and width using a special digital band-pass filter to reduce false detections and interferences present in ECG signals. The algorithm also includes methods to perform derivative operation, squaring, integration and adaptive thresholding.

Any abnormality of conduction takes longer and causes 'widened' QRS complexes. Prolonged duration indicates hyperkalemia or bundle branch block and increased amplitude indicates cardiac hypertrophy. The duration, amplitude and morphology of the QRS complex is useful in diagnosing cardiac arrhythmias, conduction abnormalities, ventricular hypertrophy, myocardial infarction, electrolyte derangements and other disease states.

-Aishwarya Anand and Swathi Makham
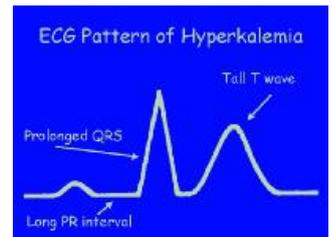
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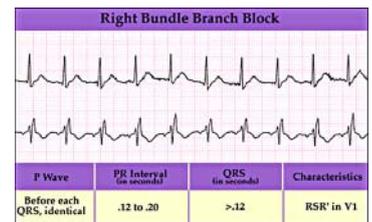
Snippets

Near threshold sound detection

Fangyi Chen, Dingjun Zha et al, Researchers from Oregon Hearing Research Center, USA, have proposed a new mechanism of resolving faint sounds that are on the verge of hearing threshold in a noisy environment. These faint sounds produce 0.1-nm basilar membrane displacements, a distance smaller than conformational transitions in ion channels. The authors hypothesized that vibration at the apical side of hair cells is enhanced compared with that at the commonly measured basilar membrane side. They have taken the aid of optical coherence tomography in proving their hypothesis and demonstrated that apical-side vibrations peaked at a higher frequency, had different timing and were enhanced compared with those at the basilar membrane. These findings are published in January edition of Nature Neuroscience.

Carbon Nanofiber: PLGA Patch to heal heart

A conductive patch of poly (lactic–co-glycolic acid) (PLGA) (50:50 wt.%)–carbon nanofiber (CNF) composites has been developed by researchers at Brown University which helps the heart tissues to regenerate in a dish. Thomas Webster the lead scientist says that " he examined not just the muscle cells that beat, but also the nerve cells that help them contract and the endothelial cells that line the blood vessels leading to and from the heart. The fact that the patch helped regenerate all three types of cells, which function interdependently in the heart, suggests the newly grown tissue is similar to normal heart tissue. These findings are published in Acta Biomaterialia.

A paralyzed man made to stand with the aid of his own brain impulses

The treatment, devised primarily by UCLA neurobiologist V. Reggie Edgerton, is designed to activate a patient's spinal nerves just enough to make them responsive to sensory signals coming from the legs.
25-year-old Rob Summers, who was paralyzed below the chest in a car accident in 2006, can now stand for several minutes on his own thanks to treatment designed by Edgerton.
The therapy consists of a stimulator device originally designed to treat chronic pain, which was implanted near the spinal cord.
Once that signal is given, their research shows, the spinal cord's own neural network combined with the sensory input derived from the legs to the spinal cord is able to direct the muscle and joint movements required to stand and step with assistance on a treadmill. A vital aspect to the work was having the individual's spinal cord neural networks retrained to produce the muscle movements necessary to stand and to take assisted steps. This training work took more than 2 years to complete.

"A paralyzed man made to stand with the aid of his own brain impulses "

Summers being trained to sit and stand with the aid of Caudal Stimulation

Engmednews

Send your articles to:

Editorial Support team:

Supriya Babu (faculty),

Sanjay Naidu B A S, Prasanna Herle, Swathi Makam, Aishwarya Anand (students) MSRIT

Forthcoming Events

XVIth World Congress of Cardiology, Echocardiography & Allied Imaging Techniques
Date: 30 September 2011 to 2 October 2011
Place: Delhi (NCR), Delhi, India
Website: http://www.worldcon2011.org

This congress will provide a forum where medical professionals will have a unique opportunity to discuss the various aspects of cardiovascular medicine, including recent advances, diagnosis, prognosis and various therapeutic aspects.

Neuroinformatics Workshop
Date: 1-3 November 2011
Place: National Brain Research Center, Manesar, Gurgaon
Website: http://www.nbrc.ac.in/workshop/INCF_Indian_Node_Workshop.pdf

This workshop covers (i) Molecular &Cellular Neuroscience (ii) Systems&Cognitive Neuroscience (iii) Neuroimaging& Clinical Neuroscience (iv) Modelling
Contact: pravat.nbrc@ gmail.com

Medex-2011
Date: 9-11 September-2011
Place: SLECC, Colombo, Srilanka
Website: http://medex2011.in/

It is the largest exhibition & Conference on medical Tourism, Technology & equipment, related products and services in the Asia-Pacific region. The exhibition widely covers ten thousands of products such as medical imaging, in vitro diagnosis, electronics, optics, first aid, rehabilitation nursing, medical information technology and outsourcing services

The 6th International Conference on Bioinformatics and Biomedical Engineering (iCBBE 2012)
Dates: May 17th to 20th, 2012
Place: Shanghai, China. iCBBE 2012
It will bring together top researchers from Asian Pacific areas, North America, Europe and around the world to exchange research results and address open issues in all aspects of bioinformatics and biomedical engineering. All accepted papers will be included in IEEE Xplore and indexed by Ei Compendex and ISTP.