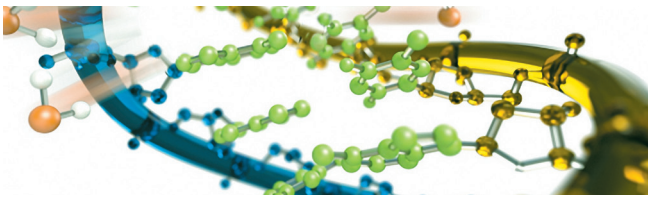
The 5th Biomedical Engineering International Conference

BMEiCON 2012



December 5 - 7, 2012

UbonRatchathani, Thailand
& Champasak, Laos

Welcome Message for BMEiCON 2012

Dear Colleagues,

It is my great pleasure to welcome you to the 5th Biomedical Engineering International Conference (BMEiCON 2012) which is an annual international conference organized by Thai Biomedical Engineering Research Association. The BMEiCON is the only international conference that mainly focuses on research in the field of biomedical engineering organized by Thai association. Biomedical engineering is a multi-disciplinary research that is required skills, knowledge, and collaboration from various disciplines. It has played an important role in human health and well-being improvement, and also gained increasing interest from researchers around the world.

This year, the BMEiCON 2012 is held in Ubon Ratchathani, Thailand and partially in Pakse, Lao PDR. These two are like sibling cities. Ubon Ratchathani is a province with long history and located in the northeast of Thailand. It is famous for the Candle Festival at Thung Si Muang, the central park of Ubon Ratchathani, and the pre-historic paintings at Pha-Tam. Because Ubon Ratchathani is the most eastern province of Thailand, you can see the sunrise before anyone in Thailand at Pha Chana-Dai. In addition, there are several beautiful & natural sceneries you may observe throughout Ubon Ratchathani.

I hope that you will succeed in your research and use this great opportunity to meet, connect, exchange, and collaborate with other researchers.

Sincerely,

Assoc. Prof. Nongnit Teerawatanasuk
President
Ubon Ratchathani University

President of the ThaiBME Association Message

Dear Colleagues:

It is my great pleasure to welcome all the participants to the Biomedical Engineering International Conference (BMEiCON 2012), that will be held on December 5-7 at Ubonratchathani, Thailand. This conference is the Fifth annual conference and the fourth time symposium held in Thailand. Everyone may remember the BMEiCON 2008 2009 and 2011 were held in Bangkok , Phuket and Chiang Mai respectively. However, this time is very special. The participants will join Conference Banquet at Arawan Riverside Hotel in Pakse, Laos. The research networking event, in addition, will be held at the following day, being impressed by the large waterfalls and observing a breathtaking scene of the double waterfall. Laos has become popular with tourists for its relaxed style of living and for retaining elements of the "original Asia" lost elsewhere.

The conference feature a wide range of contributions, distributed across special sessions that represent the board range of interests in biomedical engineering. It is our hope that the conferences will provide avenue for exchange of scientific information, a meeting place for networking with colleagues, and an opportunity to present recent research.

As the ThaiBME association President, I also encourage you share your professionalism and expertise not only with those you work with, but with the up and coming biomedical work force that will take our efforts to new levels in the future. BMEiCON 2012 will welcome university students and others new to the field from around the world who are embarking on exciting careers in biomedical engineering field.

The help, guidance, and suggestions are always be welcomed absolutely. With all your support, I assure that service and sense of community will be increasing.

I wish you and all your families a happy and prosperous 2012, and I look forward to seeing you at BMEiCON 2012 at Ubonratchathani, Thailand.

Somkiat Wattanasirichaigoon
President, ThaiBME

General Chair Message

Colleagues, Distinguished Guests, Ladies and gentlemen;

Welcome to BMEiCON 2012. The5th Biomedical Engineering International Conference (BMEiCON 2012) is being held from December 5 through December 7, 2012 at Ubonratchathani, Thailand. This year BMEiCON2012 will celebrate the 10th anniversary that IEEJ and ThaiBMES jointly organize the conference since 2002. At that time, the conference was organized under the name ISBME2002. For BMEiCON2012, it will be the first time that the venue is in two countries; an excellent technical program will be in ubonratchathani, Thailand where the Research Networking Event and conference banquet will be held in Pakse, Laos - the beautiful neighbor of Thailand.Futhermore, the conference will take place during the great time – the King' birthday of Thailand, December 5.

The BMEiCON 2012 provides an established forum for scientists, engineers, researchers, practitioners, and professionals on the field of biomedical engineering to exchange ideas, latest research results and informationin these areas through presentation and discussion

On the social side, we are greatly delighted present a Welcome Party with special Thai traditional cuisine, and the participants may join a Banquet with local taste in Pakse. Laos. Moreover, I feel very much obliged to honorable keynote speakers, chairpersons, authors, participants, all committee members and other staff for their supports. I hope that all of you enjoy the meeting and find it a rewarding experience.

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BME-2012-005 : SPECTRON: Streaming Processor Specific for Adaptronic and Biomeditronic Applications

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Keywords:
Reconfigurable Streaming Processor, Adaptive,Signal Processing, Floating-Point Arithmetic, CORDIC Algorithm, Biomedical Electronic Engineering, Adaptronic

Abstract:

This paper presents a streaming processor specifically designed for adaptronic and biomedical engineering applications.The main characteristics of the streaming processor are the flexibility to implement floating-point-based scientific computations commonly performed in the digital signal processing application. The floating-point operators are connected to dual-port memories through separated 3 operand-buses and 2 resultant-buses. Synthesized with 130-nm technology, the Spectron can be clocked at 480 MHz. The processor can perform 4 parallel streaming/pipeline floating-point operations using its FPMAC and CORDIC cores, resulting in a performance of about 4 × 485 = 1.94 GFlops (Giga Floating-point operation per second), which is suitable for high performance image processing in biomedical electronic engineering applications.

BME-2012-009 : Parasympathetic Autonomic Function Monitoring

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Keywords:
Parasympathetic autonomic function respiratory sinus arrhythmia orthostatic stress

Abstract:

A noninvasive parasympathetic autonomic function monitoring system was developed. Nine healthy adults were recruited. ARX model was used to precisely separate the effect of respiration and systolic blood pressure to heart rate variability (HRV). The respiratory sinus arrhythmia (RSA) impulse response magnitude, the parasympathetic autonomic function index, was estimated during supine and standing conditions. We found the RSA impulse response magnitude during supine and standing, orthostatic stress, are significantly different ($P<0.05$). Therefore, it is possible that our measurement system can be used as a parasympathetic autonomic function monitoring system.

BME-2012-010 : An Experimental Setup for Measuring Distance and Duration of Rat Behavior

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Keywords:
Rat's behavior; Behavior Analysis;Tracking System; New Drug Development

Abstract:
Experiments of rat behavioral analysis have been playing important part in psychology, brain science and medical science. Open-field test is a popular experiment to study rat behavior. Elevated plus maze and holeboard model are usually used for open-field test. Their behavioral parameters such as moving distance, duration and actions in regions of interest are usually considered. These parameters are observed and recorded by human, certainly, it involves some human error. Commercial recording and analyzing programs are available but they are expensive. In this paper, we proposed a simple method for measuring parameters of rat's behaviors in the elevated plus maze and holeboard model test by using webcam and simple computer program. The camera is installed over the models. Parameters measured are distance and duration of rat's movement in the interested area. The proposed method consists of two main processes. Firstly, background modeling; K-mean clustering technique is adapted to reconstruct the background.
Secondly, rat is extracted by means of background subtraction. Position and duration are measured in the selected area. To test performance of the proposed method, precision of

the proposed method on elevated plus maze and holeboard models is considered. It is about 0.98 and 0.69 centimeters of error for elevated plus maze and holeboard models, respectively. The results show the feasibility of the proposed method. Advantage of the proposed method over other is that our method is simple selfsetup for experimenter.

BME-2012-011: Modelling damaged lung pressure–volume behaviour

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Abstract:
This paper investigates the performance of a model of time dependent lung pressure-volume behaviour when applied to experimental data from neonatal piglets. The model was built using Labview and applied to experimental dynamic recruitment data from the previously published studies of other researchers. The experimental data featured multiple tidal pressure-volume loops during inflation and deflation to/from total lung capacity (TLC) respectively, but the model was not able to replicate these satisfactorily. Model performance was substantially poorer during deflation from TLC (deflation limb) than during inflation to TLC (Inflation limb). Ideas are discussed for improving the model. Keywords-Bates & Irvin Lung Model; Saline Lavage; Time Dependence; Recruitment; Half Inflation Pressure; Critical Pressure; Labview; Lung Unit; Asymptotic Volume; Neonatal Piglets

BME-2012-012 : Implementation of Implantable Microphone in the Middle Ear Cavity and Telemetry Module

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Keywords:
Hearing aid, implantable, microphone

Abstract:
With the advent of implantable hearing aids, acoustic sensing strategy of the implantable microphone becomes an important issue. In this paper, placing the microphone in middle ear cavity (MEC) is proposed and researched feedback characteristic when both the implantable microphone and transducer were in the MEC. Analytical and finite element analysis were conducted and implemented the microphone to have a natural frequency of 7 kHz. The implemented microphone showed good characteristics of SNR, sensitivity, and vibration immunity. For the verification, small animal in vitro experiments (n=4) conducted. From the experiments, the gain margin was measured and showed feasibility to use.

BME-2012-013 : A Point-of-Care and Routine Clinical Instrument based on Artificial Nose: Study of Volatile Emission from Axillary Skin

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Keywords:
hand-held electronic nose; e-nose; human odor;sweat; health care monitoring; armpit

Abstract:
A hand-held electronic nose (e-nose) based on polymer/carbon nanotube (CNT) is presented as a point-of-care clinical instrument. The system was designed to support key requirements such as compact body, lightweight and low cost suitable for home-based diagnostics. This paper is a case study to demonstrate clinical application of an e-nose by investigating volatile organic compounds (VOCs) as generated from the armpit area of a volunteer during twelve hours. Six chemical sensors, which can respond to VOCs being available in human skin and sweat such as ammonia, amines, acid, alcohol and acetone, were chosen to collect odor information according to the principle of expansion of polymer volume. Principal component analysis (PCA) based on a statistical pattern analysis was used to classify and analyze the VOCs fingerprint. The experimental results have shown that this device can be a useful instrument for monitoring the health status of patients at home.

BME-2012-015 : Improvement in the Algorithm for Accurate Detection of Muscle Activity from EMG

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Keywords:
Electromyogram, Standard deviation, The on-off EMG signal

Abstract:
This paper presents the novel algorithm for accurate detection of muscle activity from EMG. The tibialis anterior muscle supports the human movement when the exercise with the tipping toes up method is performed. Ten healthy volunteers who are between 18 – 25 years old participate in determining the on-off EMG signal. The system consists of an amplifier with gain 981, CMRR at 91 dB, and a band-pass filter at the cutoff frequency of 50-500 Hz. Sampling frequency was 1000 Hz. Total EMG signal are 20 data sets. A window size was set at 2500 millisecond for each data set. The performance of the proposed algorithm, which is based on forward and backward standard deviation (FBSD), is compared with the conventional standard deviation (CSD) method using a mean absolute error value (MAE). Result shows that MAE values of the FBSD are better than those from the CSD method. That is, while the average MAEs of CSD are 2.85 and 155.9 for the on and off times of EMG, the average MAEs from FBSD are only 1.4 and 1.9, respectively.

BME-2012-017 : The comparison with the function of children's pronation and supination using acceleration andangular velocity sensors

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Keywords:
pronation and supination, acceleration andangular velocity sensor, attention deficit hyperactivity disorder

Abstract:
A pronation and supination of forearms is used as one of diagnostic indices for developmental disorders. However, this index has a demerit in which evaluation results between doctors are not consistent. The present study aims to establish more quantitative and evaluating method. We have developed a simple and portable evaluation system to measure pronation and supination of forearms. In this study, we have measured the pronation and supination of the forearms of 261 subjects aged 7 to 12 years (healthy children : 201, ADHD children : 60) and compared the function of healthy children's pronation and supination with the function of ADHD children's pronation and supination by new indices. From the results, we could obtain a difference between healthy children and ADHD children. The results showed that our developed system has the potential to become diagnostic criteria for developmental disorders.

BME-2012-018 : Natural Interaction on 3D Medical Image Viewer Software

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Abstract:
A common interaction with medical 2D and 3D images is to apply windows, icons, menus and pointers (WIMP) paradigm; however, WIMP might not be convenient in some situation, such as in the operating room where sterilization becomes an issue. Thus, in this project, the controller-free natural interaction on 3D medical image viewer software through a Kinect camera will be developed to replace WIMP such that surgeons can view medical images in the operating room without contacting mouse and keyboard. The interaction will include both body and figure gestures. The 3D medical image viewer software will be based on the Visualization ToolKit (VTK) library to visualize 3D image data in the DICOM (Digital Imaging and Communications in Medicine) format. Moreover, suitable controller patterns will be designed according to practical use in the operating room.

BME-2012-019 : Estimation of Longitudinal Muscle Motion using a Primal-dual Algorithm

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Keywords:
Ultrasonography, motion estimation, primaldual algorithm, gastrocnemius muscle.

Abstract:

Ultrasonography is a convenient and widely-used technique to view the longitudinal muscle motion as it is noninvasive and real-time. However, the estimation of longitudinal muscle motion, in sense of dense deformation field, was paid little attention to previously. In this report a primal-dual algorithm was used to estimate the motion of gastrocnemius muscle (GM) in longitudinal direction. Then a color encoding scheme and the mean velocities (mm/s) of frame-wise motion field were adopted to show the synchronous activities. The preliminary results, on 600 frames of ultrasound muscle images in motion, demonstrated that the proposed estimation method are helpful to study of the contraction of muscle in longitudinal direction, providing motion details both spatially and temporally.

BME-2012-020 : Preliminary Results of Death Cell Counting Based on K-mean Clustering

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Keywords:
Computer-assisted program, Cell counting, K-mean,Hough transform, Apoptosis

Abstract:
Death cells and living cells counting after cancer drug treatment is a mandatory process for in vitro study to evaluate the effectiveness of the treatment in cancer research. The conventional process using trypan blue dye staining requires expertise and it is time-

consumed and tedious work. The aim of this study was to develop a computer-assisted program that counts a number of cells by using image analysis. There were five steps to complete in this study; i) input image acquiring, ii) cell extraction from a background, iii) noise reduction, iv) cell counting and v) output with expert comparison. K-mean algorithm was selected to use to extract features and cluster objects in the images. Hough transform was also performed after completion of k-mean algorithm and noise removal. The counting results using our code had a greater number of both death cells and living cells compared with the counting results from the expert. The accuracy of death cells counting and living cells counting were in range of 33% to 97% and 74% to 100%, respectively. However, the process time was short, only 2-3 second per image. This computer-assisted program needs to further develop as a graphic user interface (GUI) to make it easier for users as well as making higher accuracy.

BME-2012-021 : Fabrication of Permeable Separator as A Nano-Porous Scaffold for Bio-Reactor

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Keywords:
Nano reactor, Micro fabrication, Silica hydrogel.

Abstract:
In this study, nano-porous membrane of silicate hydrogel was developed as a separator wall of nanometer-sized bioreactor chambers. Thin silicate polymer membrane was fabricated on a silicon support structure by spin coat technique. Monomer concentration and pH of silicate reaction mixture was investigated to obtain appropriate porosity and mechanical strength of the membrane. The silicate gel membrane can be used as a semi-permeable membrane that controls the diffusion rate of substrate molecules. It also can be employed as a matrix for enzyme immobilization. Chemical stability and established surface modification techniques of silicate polymer are suitable for protein immobilization material. Silicate hydro-gel is, however, very fragile and it's use as an thin wall of a bioreactor separator is difficult. To reinforce the silicate membranew, it was spin coated on a silicon support structure with micrometer sized through holes, which was fabricated by anisotropic wet etching process. The immobilization density of enzyme molecules on the silicate gels was also investigated with various polymerization conditions. Results shows the enhancement of immobilization density by the factor of c.a. 20.

BME-2012-022 : Optimization of visual presentation of MRI image for accurate detection of tumor in human brain using virtual instrument.

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Abstract:

Brain tumor is the uncharacteristic growth of cells inside the brain or the skull that can either be cancerous (malign) or non-cancerous (benign) [1]. A very important aspect in clinical practice is the early detection and classification of brain tumors. The value of advanced imaging platforms such as magnetic resonance imaging (MRI) for early detection of tumor remains unclear. The paper applies Lab VIEW software for detecting and locating early stage brain tumors from MRI data. Here we designed a system which enhances the MRI data and gives the exact location and the area of the tumor required for the diagnostic and analysis of tumor easily. The estimation time required to perform the inspection is also obtained from the performance meter.

BME-2012-024 : The Design and Construction of Infusion Pump Calibrator

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Keywords :
calibration ;flow rate; occlusion pressure

Abstract:
The purpose of this research was to study on the design and construction of infusion pump calibrator. This research has adopted the principle of physics, electronics and microcontroller. The designed and constructed the infusion pump calibrator was composed of three main parts:
1) the control part consisting of micro switches for selected the operating mode,
2) signals detection part composing of load cells, pressure sensor for measuring flow rate and occlusion alarm respectively
and 3) the processing and display part comprising of microcontroller AVR ATmega1280 with C Language program and LCD sequentially. The results of functional testing were compared with standard infusion devices analyzer Metron Lagu showed that the average percentage error of flow rate measuring and occlusion pressure tests were 0.45 percent and 0.21 percent successively.

BME-2012-025 : Optical Coherence Imaging for Monitoring of Microscopic Flow in Biological Samples

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Keywords :
optical tomography, 3D imaging, noninvasive imaging, microscopic flow, flow velocimetry, Doppler

Abstract:
System design and implementation of a Fourier Domain Optical Coherence Tomography (FD-OCT) for microscopic flow monitoring is presented. The system is capable of capturing flow characteristics underneath the surface of biological samples at micrometer resolution. The high speed imaging capability allows for in vivo 3D mapping of micro-structure of biological tissues as well as their microvasculature system. An image resolution of 10 microns over 1 mm depth from the sample surface and across a 10 mm x 10 mm lateral field-of-view is possible. The capability of the developed system for monitoring of flow activity within the heart of an African frog tadpole is demonstrated.

BME-2012-026 : Health Status Monitoring by Discrimination of Exhaled Breath with an Electronic Nose

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Keywords :
Cancer detection, electronic nose, exhaled breath, gas sensors, PCA, volatile organic compounds (VOCs).

Abstract:
In an aging society, people unprecedentedly spend more attention to routine assessment of their health status. Besides self-check and doctor's examination, there are also biomedical devices capable of monitoring and indicating the status of human health. In this paper, we proposed an electronic nose system that has been developed to have the ability to detect odor from human breath in order to indicate the health status of its owner. Metal-porphyrins (MPs)/SWNT-COOH and polymer/SWNT-COOH nanocomposites sensors were used as the array of chemical gas sensors inside the electronic nose system. These sensing materials

are sensitive to odor molecules presented in the exhaled breath. The constructed device consumes low power and can be operated at room temperature. A preliminary experiment was conducted on the sample group consisting of cancer patients and healthy volunteers to distinguish their health status indicating diseases. It was found that the e-nose can detect exhaled breath odors and discriminate the pattern of breath odor of each person. This will be useful in discriminating one's breath odor and identifying his health status. This device could help reduce the risks of getting infected from any disease beforehand.

BME-2012-027 : Directional Eye Movement Detection System for Virtual Keyboard Controller

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Keywords:
component; EOG-based system design; human-computer interface (HCI); virtual keyboard

Abstract:
several researches concerning electrooculography interface for Human Computer Interface (HCI) have been developed in recent years. For applications of disabled person such as lock-in, and Motor Neuron disease, a simple and effective technology for communication is necessary. Eye blink is defined as a selection command in existing research. Problem of current research is occurred when user blinks his eye involuntarily. To resolve this problem, in this paper, we develop a new electrooculography based system for typing words via virtual keyboard by using voltage threshold algorithm. EOG signal with different direction of

eye movement in horizontal and vertical directions are detected. EOG signal is measured by two channels with six electrodes. Measurement circuit consists of three major processes: instrument amplifier, filter and signal conditioning amplifier processes. These circuits filter noise out, pass frequencies in ranges of EOG signal and then amplify the signal. The voltage threshold algorithm is then used to classify the EOG signal. Selection command is defined by closing eye in a short period of use to avoid eye blink involuntary. To test the performance of method, typing rate and accuracy are measured. Typing rate on virtual keyboard 25.94 seconds/letter and its accuracy is 95.2%. The results show the feasibility of proposed method.

BME-2012-028 : Development of a Wireless Electronic Shoe for Walking Abnormalities Detection.

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Keywords:
Force sensitive resistor, gait analysis, ZigBee sensor network, abnormal walking, pattern recognition.

Abstract:
This work portrays the development of wireless smart shoe for gait analysis. Force sensitive resistors (FSRs) and resistive bend sensor were employed by mounting onto a shoe for detection of pressure distribution beneath the foot during normal and abnormal walking. In the present study, we have been interested in 3 walking postures including normal walking, tiptoe walking and dragging foot walking. Wireless sensor network (WSN) based on ZigBee technology was employed in this work for data communication. The Principal component analysis (PCA) was used for pattern recognition in the analysis part. It was shown that the smart shoe was successful to classify between normal gait pattern and some abnormal gait patterns.

BME-2012-029 : ERP and Time frequency analysis of response to Subject's own name.

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Keywords:
SON, novelty p300, theta oscillations.

Abstract:
Hearing one's own name plays an important roll in external communications and internal cognition within our minds. Though hearing one's own name well has been studied, the relationship between hearing one's own name and self-awareness is not understood. In this study, we focused on brain responses to hearing one's own name. In order to assess the pattern of ERP and the power of EEG frequency during hearing one's own name, we used a passive oddball paradigm that included the subject's own name (SON). The grand average ERP showed that mismatch negativity and novelty p300 were elicited by SON. Time frequency analysis revealed that theta power and beta power were increased around 400-600 ms after stimulus by SON.

BME-2012-030: Preparation and characterization of type I collagen/PVA hybrid biomimetic hydrogels scaffold for wound healing

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Keywords:
Collagen, biomimetic, hydrogels, wound healing

Abstract:
This study reports in vitro reconstitution of the development of type I collagen/PVA biomimetic hydrogels with good operability and stability by the freeze-thaw technique. To improve performances, the hydrogels were hybridized by biomimetic collagen type I. Structure and morphology were characterized with FT-IR, DSC and SEM. FT-IR spectrum and DSC thermograms of collagen/PVA hydrogels showed peaks that shift to lower peaks than PVA hydrogels and a higher peak than collagen hydrogels because of the complicated structure inside the hydrogels. The morphology observed by SEM showed that collagen mimicked into fibrils and formed a network structure and hybridized with PVA texture as the structure of skin. Therefore, the collagen/PVA hydrogels scaffold might be well suited for skin engineering of wound healing.

BME-2012-034: Heart rate variability analysis for abnormality detection using time frequency distribution: Smoothed pseudo wigner-ville method

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Keywords:

HRV, RR Tachogram, Resampling, STFT, SPWVD

Abstract :

The Heart rate variability (HRV) is derived from the time duration between consecutive heartbeats. The HRV reflects the heart's ability to adapt to changing circumstances by detecting and quickly responding to unpredictable stimuli to cardiac system. Depressed HRV is a powerful predictor of mortality and of arrhythmic complications in patients after diseases like acute Myocardial Infarction. The degree of variability in the Heart Rate (HR) provides information about the nervous system control on the HR and the heart's ability to respond. Spectral analysis of HRV is a frequency domain approach to assess the cardiac condition. In this paper, one such method for analyzing HRV signals, Smoothed Pseudo Wigner Ville transform (SPWVD), is proposed. The sub-band decomposition technique used in SPWVD, based on Instantaneous Autocorrelation (IACR) of the signal, provides time-frequency representation for very low-frequency (VLF), low-frequency (LF) and high-frequency (HF) regions identified in HRV spectrum. Results suggest that SPWVD analysis provides useful information for the assessment of dynamic changes and patterns of HRV during cardiac abnormalities.

BME-2012-035: A Programmable Sanding Box Rehabilitation and Evaluation System

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Abstract:
We aim to develop a novel and enhanced device which can not only help patients to undergo rehabilitation for upper limb impairments, but also help medical staff to better monitor the details of the rehabilitation training. With this information, medical staff can create much more appropriate therapy programs for patients with upper limb functional impairment

BME-2012-037: Development of A Brain Computer Interface to Record and Analyze Intracortical Neural Signals

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Keywords:
Intracortical, Brain-computer interface (BCI),Nonlinear energy operator (NEO), Independent component analysis (ICA), Dynamic dimension increasing (DDI), k-means

Abstract:
In this study, a microwire array electrode is connected to a multichannel integrated system which is based on braincomputer interface structure. The system is employed to record and analyze the intracortical neural signals from primary somatosensory cortex of rats. The integrated system consists of the acquisition sub-system, the monitoring sub-system, and the signal analyzing sub-system. The acquisition sub-system can capture the tens of micro voltage from the cortex of rats. The information of monitoring sub-system is applied to assist us in proving of experimental results using a video recording device. The functions of analysis sub-system mainly include signal preprocessing, feature extraction, and classification. We employ the self-developed integrated system to record and analyze the somatosensory evoked potentials of rats. These evoked signals are processed according to the presented procedures. First, spectral subtraction is used to reduce noise and then the nonlinear energy operator is adopted to detect spikes. This process is the signal preprocessing. The independent component analysis is utilized to extract features from brain neural signals. Then, k-means is used to group the feature vector into different clusters. We apply the information of monitoring subsystem to check the experimental results. Finally, the presented multichannel integrated system is utilized to record and analyze the various brain neural signals.

BME-2012-038: Using Post-Graduate Research to Introduce Biomedical Engineering to Pre-University Students

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Keywords:
Education, Prostheses, Pre-University, Students

Abstract:
Biomedical engineering is a growing and useful industry, and as such it is important to educate people about it. Due to the nature of the topic it can be difficult to put across field-related concepts to those not in the field. This paper seeks to perform a preliminary investigation into presenting an example of biomedical engineering to pre-university students. By simplifying the physical aspect of a biomedical engineering project and adjusting the focus to re-introduce basic concepts relating to science and engineering (which may usually be ignored), short presentations were able to be given to primary and high school students in a simple and interactive way. Preliminary results showed a link between the interest of the teacher and the interest of the students (in engineering and science), as well as demonstrating a link between age and attention span to the biomedical aspects. Locale and socioeconomic status also appeared to be correlated to interest in engineering. Further research would need to be performed to determine how the initial interest corresponds to interest in biomedical engineering during later education.

BME-2012-039: Computational Analysis of the Substrate Recognition Mechanism of ADAM17

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Keyword:
ADAM17, TACE, Metalloproteinase, Substrate recognition, Protein-peptide docking

Abstract:
ADAM17 (a disintegrin and metalloproteinase) is an important membrane-bound proteinase that can release a lot of proteins from their membrane-bound forms, such as cytokines, cytokine receptors, and adhesion proteins. ADAM17 has long been a potential therapeutic target in a lot of diseases. However, No ADAM17 inhibitors have entered the clinic use, partly due to our very limited knowledge on its substrate specificity and selectivity. To help understanding the substrate specificity of ADAM17, a rational complex model is computationally built for the catalytic domain of ADAM17 and its substrate sequence from the TNF-alpha precursor. With protein-peptide docking analysis, we noticed that the substrate sequence is indeed important for ADAM17 recognition and processing. The result in this paper could be useful to understand the substrate specificity and selectivity of ADAM17, and the design of novel ADAM17 inhibitors in the future.

BME-2012-040: Diabetes Diagnosis by Direct Measurement from Urine Odor Using Electronic

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Keywords:
E-nose, PCA, smart toilet, chemical sensor, diabetes.

Abstract:
Diabetes is one of the most common chronic diseases and can occur at any age. To avoid many side effects of diabetes on health, early detection of diabetes is very necessary. In this paper, we propose an alternative method to detect diabetes based on direct measurement of urine odor by using an electronic nose (E-nose). Artificial urines, used to simulated a situation of diabetes patient, were produced by adding glucose into the pure urine samples. Eight commercial chemical gas sensors were used as the sensing elements of our e-nose. Principal components analysis (PCA) and cluster analysis (CA) methods were employed for data analysis. The PCA and CA results show that the proposed technique was able to identify the glucose concentration in urine. In the future, e-nose can be a potential tool for diabetes diagnosis by healthcare personnel as well as home users.

BME-2012-041: Feasibility of Bombyx Silk Fiber Polymer Composite as materials for medical applications: Preparation, Physical and Mechanical properties

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Keywords:
Natural Bombyx Silk Fiber Polymer Composite, Carbon Fiber Polymer Composite, acrylic resin, lamination compression techniques, Mechanical test

Abstract:
Natural Bombyx Silk Fibers were fabricated as silk fiber polymer composites using acrylic resin by lamination thermoforming technique. The physical and mechanical properties of the composites were investigated and the test results were compared to the synthetic carbon fiber polymer composites. The results found that although synthetic carbon fiber polymer composites provided as high a performance of mechanical testing, including tensile strength test, hardness test and flexural test as natural Bombyx silk fiber polymer composites; however, the natural fiber composites had a lower weight ratio and thickness ratio compared to the synthetic polymer composites.

BME-2012-043: The Effects of Acute Nitric Oxide Synthase Inhibition on Systemic Circulation and Organ Blood Flow

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Keywords:
Nitric oxide;L-NAME, organ blood flow, hypertension

Abstract:
Nitric oxide (NO) is known as an important mediator in vasorelaxation and blood pressure regulation. NO is produced from nitric oxide synthase (NOS) by converting amino acid L-arginine to amino acid L-citruine and NO. The reduction of NO synthesis by inhibiting NOS activities causes vasoconstriction and hypertension and affects on microvascular blood perfusion. This study aimed to evaluate the effects of NOS activity on organ blood flow distribution by an acute blocking in a hamster dorsal skin fold window chamber model. The inhibition of NOS activities was performed by an intravenous infusion of N(G)-nitro-L-arginine methyl ester (L-NAME). The organ blood flow distribution was assessed with different color fluorescent microspheres over three hours of study. The preliminary results showed that L-NAME significantly increased systemic mean arterial pressure but it decreased heart rate. Venular diameters significantly increased over observation time when treated with L-NAME. Blood flow relative to mean flow increased in vital organs such as heart and brain after L-NAME infusion but not kidneys. In conclusion, the impairment of nitric oxide production on cardiovascular system in this model evidently demonstrated that NO is an important mediator and potentially affects on organ blood flow distribution by reducing blood flow.

BME-2012-044: Health-Care Electronic Nose to Detect Beer Odor in Breath after Drinking

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Keywords:

optical electronic nose, breath-monitoring, spincoated thin film.

Abstract:

Breath analysis is an interesting technique to detect several volatile organic compounds presented within the human body that can indicate the health status of individuals. For this purpose, electronic nose is a convenient device, which is based on a sensor array similar to the olfactory sense as presented in human nose. At present, electronic nose has been widely applied to classify various kinds of odors including those related to healthcare such as breath monitoring. Beer is one of the most popular alcoholic beverages which effects on health and beer odor can be detected in breathing. Beer contains various volatile organic compounds (VOCs) such as ethanol, ethyl acetate and acetaldehyde. In this work, an optical electronic nose that comprises 2 thin films acting as multiple gas sensors (Zinc- 5,10,15,20-tetra-phenyl-21H-porphyrin or ZnTPP and Zinc-2,9,16,23-tetra-tert-butyl-29H,31H-phthalocyanine or ZnTTBPc) were applied to monitor the reduction of alcohol in human breath after drinking of beer. The measurement of VOCs was investigated based on change in the optical absorption of both thin films upon interactions with the breath sample. Principal component analysis (PCA) was used as classification technique to analyze VOCs in form of fingerprint. It was found that the optical electronic nose is capable of tracking alcohol decay in exhaled breath with the passing time.

BME-2012-045: Fingerprint Matching by Using 2D Discrete Cosine Transform And 2D Fourier Transforms

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Keywords:
component; formatting; style; styling; insert (key words

Abstract:
In this paper, we proposed a fingerprint matching using the two dimensional discrete cosine transform features. In this paper we crop input images from the size 480x640 pixels into 128x128 pixels, and then divided the image into 64 sub-images, earth sub_images have the size 16x16 pixels. We measure our algorithm performs by the correlation value of the 2D discrete cosine transform (DCT) and 2D Fourier transforms (FFT). And we used images for testing are obtained from FVC-2004 (DB-1A) and FVC - 2002 (DB2-A). From this evaluation and results, we can see that this method offers better performance when compared to other individual matching. Moreover, our method is not sensitive to rotational effect. The proposed technique is based on the availability of core point, therefore, the proposed technique

introduce some errors if the core point cannot be located or improperly located. The matching is performed using the two dimensional discrete cosine transform and two dimensional Fourier transform to find the magnitude of the spectrum, spectrum phase, and the value of line angle.

BME-2012-048: Development of a Geometrical Algorithm for Eye Detection in Color Images

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Keywords:
Eye Detection; Face Detection; Skin-Color Model; YCbCr-Color Space; Geometrical tests.

Abstract:
The applications of eye detection have grown significantly during the past decade. The objective of this paper was to develop a new technique for eye detection in color facial images. The implementation of this technique was composed of three steps. First step is using skin color information to detect a face in color images. The face region would be segmented from the background. Next step, illumination based method (chrominance components and luma component) was employed to find the possible location of the eyes. Finally, to locate the exact position of the eyes, the flexible thresholding method and new eye geometrical tests were utilized. The proposed technique was tested using Aberdeen facial images from Psychological Image
Collection at Stirling (PICS image database). The simulation results indicate the detection rate of 93.2% for frontal facial images and 85.7% for rotational facial images.

BME-2012-049: Comparison FEM Study of Microwave and Radio Frequency Ablation in Breast Phantom Model

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Keyword:
thermal ablation, microwave-radiofrequency comparison, breat cancer treatment, FEM

Abstract:
Thermal ablation by using energy from an electromagnetic wave in microwave and radiofrequency range is widely accepted as an alternative therapeutic maneuver for an internal cancer treatment as a breast tumor. However a comparison study between these

two techniques are still an interesting topic especially in term of main control parameters, output and outcome of an expect coagulation zone. In this research, we propose a comparison investigation of microwave and radiofrequency ablation in a breast phantom model by using FEM. Our breast model is originally and specially designed as a multi-layer tissue in order to close to a real human breast organ. The simulation results show an interesting different output from these two EMW frequencies as an ablation power, treatment time and also coagulation area significantly.

BME-2012-050: Identification of Subharmonic in Bubble Oscillations using MIMO Volterra Models

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Keywords:
Subharmonic oscillation, Ultrasound contrast agent, Nonlinear system identification, MIMO Volterra series

Abstract:
Analysis only in filter transfer function of Volterra systems is sufficient but maybe not faultless. For this paper the identification procedures of subharmonic oscillations of ultrasound contrast agent (UCA) is described and considered impulse response functions (IRFs). The method for system identification is based on multiple-input-multiple-output (MIMO) Volterra series representation. In this work identification of the MIMO method is the theme and analysis of impulse response is considered as the target on filtering subharmonic frequency for ultrasound imaging.

BME-2012-051: Prototyping Potential Control Systems to Assist Complete Quadriplegics

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Keywords:
Control systems, wheelchairs, assistive technologies for people with disabilities, prototype, quadriplegics.

Abstract:
This paper discusses a versatile wheelchair control system of potential use to complete quadriplegics. This system employs plug-in components using a common control protocol between the distributed computers. Two headset plug-in units have been developed together with two prototype wheelchairs and an automatic shopping trolley. The trolley would be of most use to a paraplegic, but suggestions are made to show how this could potentially be developed to plug into the control system as a type of "personal assistant". The system has been prototyped using language-independent commands so that it can potentially be used by quadriplegics speaking any of the approximately 7,000 languages spoken on Earth. LEGO MindStorms NXT equipment has been used to prototype this system.

BME-2012-052: Comparison of Maximum Likelihood and Time Frequency Approaches for Time Varying Delay Estimation in The Case of Electromyography Signals

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Keywords:
Conduction velocity, EMG, multi-channel acquisition, fatigue, time-varying delay estimation.

Abstract:
Muscle fiber conduction velocity (MFCV) is based on the time delay estimation between electromyography recording channels. In order to take into account the variability of the MFCV, we assume that the time delay between the channels varies over time. In the present paper, the Maximum - Likelihood estimation (MLE) of time varying delay for two channels of EMG signals that follow a polynomial model is erived. Monte Carlo simulations are performed at different noise levels in order to evaluate the noise impact of the estimator. The Maximum-Likelihood estimation was achieved by the Newton method. The delay with unknown model (inverse sinusoidal) was also investigated by cutting this delay into many slices. This approach gives the best results by comparison with the other ones.

BME-2012-053: Removal Of Blink From EEG By Empirical Mode Decomposition (EMD)

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Keywords:
EEG, Blink, Empirical Mode Decomposition (EMD), High pass filter, mean square error (MSE)

Abstract:
The electroencephalographic signals (EEG) are rather weak and contaminated with different artifacts that have biological and external sources. Among these artifacts, blinks and eye movements are the most common of them. In this paper, we introduce a new method, Empirical Mode Decomposition (EMD), for removal of blink contamination from EEG signal. The proposed method is compared to a fourth order Butterworth high-pass filtering with cutoff frequency at 2 Hz. The performance index of our experiment is mean square error (MSE) between bands of pure EEG and corrected EEG. Results obtained from the analysis of contaminated EEG signal show that EMD method outperforms the high pass filtering for elimination of blink contamination from EEG. However, EMD could not be applied on-line.

BME-2012-054: Low Cost and Customized Plantar Pressure Analyzer for Foot Pressure Image in Rehabilitation Foot Clinic

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Keywords:
Plantar pressure analysis, foot pressure image, force resistive sensor.

Abstract:
Plantar pressure image is generally accepted as an effective tool to analyze a foot pathology and disorder in foot care investigation for a long time. In this research, we propose a preliminary

study on the design and construction of low cost and customized plantar pressure analyzer for foot pressure image in a general rehabilitation foot clinic. A single bare foot loading platform is designed to measure a spread of plantar pressure inwhich combined of 72 force sensitive sensor in a form of fix array 6x12 matrix. An appropriate GUI software is specially designed in order to fit with a clinician user true requirement in both 2D and 3D pressure distribution analysis. Finally, database system for storage and retrieving in follow-up process also well develop. Not only an interesting output obtained from this study, this research also guide us to develop more customized and appropriated foot care scanner system for using in general hospital in the future.

BME-2012-055: Effect of EMG Biofeedback on Muscle Activity in Computer Work

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Keywords:
biofeedback training, muscle relaxation, prolonged work, electromyography

Abstract:
Aims of this study were to develop the biofeedback tool and to investigate its effects on the upper trapezius (UT) muscle activity during computer work. The biofeedback provided auditory and visual feedback in the electromyography (EMG) of the UT muscle and the degree of neck movements. Thirty-six computer users with mild to moderate pain in their

upper trapezius muscles were recruited. The biofeedback group (n=18) and the control group (n=18) continuously performed typing tasks on the computer for 30 minutes. The results confirmed that the biofeedback group significantly reduced the UT muscle activity ($p<0.05$) during computer work.

BME-2012-056: Fractionation Characteristic Evaluation in a Squeezing-Electric-Field-Type Cell Sorter

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Keywords:
cell sorter, dielectrophoresis, micro-fabrication

Abstract:
The purpose of this study is the development of a medical cell sorter. Cell sorters that are currently used were developed for research, but they have problems of high running cost or risk of infection in medicine. Here, we reduce operating costs by using a photolithography technique. This cell sorter uses dielectrophoretic force to act on non-charged particles in a non-uniform electric field, and the force increases in proportion to the gradient of the square of the field intensity. We utilized the stronger dielectrophoretic forces to act on cells by raising an electric field that was confined through applying a voltage to the solution of the complex dielectric constant, which was smaller than the surrounding wall, and therefore narrowed the shape of the fractionation. We confirmed that this cell sorter gave the slope of the probability of 27.8%. As a result, we showed that dielectrophoresis in this cell sorter could be used to distribute non-charged particles.

BME-2012-058: Noise Removal in ECG Signals using the Quadratic Filter

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Keywords:
Electrocardiography (ECG), ECG beat detection, Signal processing, Quadratic filter, Volterra filter

Abstract:
This article studies the capability of applying the quadratic filter (QF) for removing noise in ECG R-peak detection preprocessing. The important advantage of the QF, which is a 2D filter, over linear filtering is that it has two degrees of freedom for optimizing noise removal in ECG signals. The QF is designed in the frequency domain based on the sum of two 2D Gaussian filters. Subsequently, the filter coefficients can be obtained using the inverse Fourier transform. The QF from proposed algorithm was evaluated with ECG signals from the MIT-BIH arrhythmia database (MITDB). Results show that the QF provides the SNR value better than that from the conventional linear filtering 20 dB in ECG noise removal. This opens the opportunity for the QF as a preprocessing step to increase accuracy in ECG R-peak detection.

BME-2012-059: On-chip Irreversible Electroporation for Bacterial Cell Membrane Rupture

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Keywords:
Microfluidics, Irreversible Electroporation, Pulsed electric field.

Abstract:
In this work, the DNA preparation process for genetic analysis was developed. To rupture the cell membrane of Salmonella on a microfluidic chip, high electric field pulses were applied through gold electrode. The applied voltage was less than 10V DC voltage. Electric field pulses were short-duration in microsecond. Fluorescent spectrophotometer was employed for live/dead bacterial cells detection. The live bacterial cells were tagged by SYTO 9 green fluorescent stain. The red-fluorescent nucleic acid stain, propidium iodide was used to tag the dead cells. The highest percentage of 95% dead cells was at 7V applied voltage and 90 µs pulse duration. This result was confirmed by plate count with completely dead cell.

BME-2012-060: EEG Analysis of Mental Concentration in Golf Putting

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Keywords :
EEG, Event-related desynchronization, Golf, Mental concentration

Abstract:
We analyzed electroencephalogram (EEG) recorded during golf putting in order to obtain a quantitative index of mental concentration. In previous research, we observed event-related desynchronization in the alpha band; however, the alpha-band changes did not clearly reflect mental concentration. EEG was recorded at Fz, Cz, and T3 under three different conditions: rest with eyes open (rest), assumption of putting posture (posture), and actual putting (putting). As a result, 4 participants exhibited large average power in the alpha bands during rest and posture. In the low-theta band, average power was higher during putting than during rest and posture. In addition, an expert putter showed a difference in average power in the low-theta band between successful and unsuccessful putts.

BME-2012-062: Effect of mechanical circulatory support in the heart failure patient with left–right heart failure condition:
A simulation study

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Keywords:
Mechanical Circulatory Support, Rotary Blood Pump, Emax, LVAD

Abstract:
Mechanical circulatory support (MCS) is increasingly used in the end-stage heart failure patients. The rotary blood pump (RBP) is a novel technology of MCS that currently used in the left ventricular (LV) failure patient. After RBP implanted in LV, some patient immediately need another RBP on the right side of the heart. The effect of LV-RBP or left ventricular assist device (LVAD) on the right ventricle (RV) has been simulated in both normal RV and pathology RV for education proposes. This simulation was regulated the pathology of the heart from normal heart (Maximum Elastance; Emax: 100%) to pathological heart (Emax: 50%) and the level of RBP support in the LV (partial support and full support). The result of this simulation showed the hemodynamics during LV-RBP support. The end-diastolic volume of left ventricle was depended on pump speed. The increasing of right ventricular volume during support was showed in the pathological RV. In contrast, the remaining of right ventricular volume during support was showed in the normal RV. In conclusion, this computer simulation can re-generated the hemodynamics and pressurevolume loop heart failure patient with MCS.

BME-2012-063: Robotic 3D position control of therapeutic ultrasonic field by ultrasound image information

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Keywords:
Ultrasound therapy, robot, transducer, probe.

Abstract:
Ultrasound is widely applied to clinical purpose of not only diagnosis but also therapy. Also, ultrasound has a potential to be applied for targeted drug delivery with microbubble as a carrier in blood vessel. These techniques require accurate position control of therapeutic ultrasound field based on ultrasound image information. Therefore, we propose a robotic system to control a position of an ultrasound transducer for therapy based on ultrasound image information. The system consists of an imaging probe, a robot with the therapeutic transducer, an optical tracking device to integrate the coordinates and positioning software. The system enables the transducer follows to an imaging probe based on a therapeutic plan. In this study, positioning and following control accuracies were evaluated. The results demonstrate the system has a potential for targeting the transducer based on intra-operative planning.

BME-2012-064: Human Falling Detection Algorithm Using Back Propagation Neural Network

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Keywords:
Fall, fall detection, neural network.

Abstract:
A fall monitor system is necessary to reduce the rate of fall fatalities in elderly people. As an accelerometer has been smaller and inexpensive, it has been becoming widely used in motion detection fields. This paper proposes the falling detection algorithm based on back propagation neural network to detect the fall of elderly people. In the experiment, a tri-axial accelerometer was attached to waists of five healthy and young people. In order to evaluate the performance of the fall detection, five young people were asked to simulate four daily-life activities and four falls; walking, jumping, flopping on bed, rising from bed, front fall, back fall, left fall and right fall. The experimental results show that the proposed algorithm can potentially distinguish the falling activities from the other daily-life activities.

BME-2012-065: Increased Sample Entropy in Atrial Fibrillation Relates to Cardiac Autonomic Dysfunction Determined by Heart Rate Variability: A Preliminary Study

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Keywords:
Atrial fibrillation, sample entropy, heart rate variability

Abstract:
Introduction: Atrial fibrillation (AF) is the most common cardiac arrhythmia associated with an increased risk of left atrial thrombosis as well as ischemic stroke. In this study, we have evaluated the characteristics of paroxysmal AF (PAF) and persistent AF using sample entropy (SampEn), a new biosignal parameter for determining degree of AF signal complexity in atrial activities extracted from surface ECG, including heart rate variability (HRV) to test the hypothesis that increased atrial signal irregularity in AF patients relates to cardiac autonomic dysfunction compared with control subjects. Methods: PAF patients with normal sinus rhythm

(n = 12), persistent AF patients (n = 11), and control subjects (patient controls; n = 8, and healthy controls; n = 13) were recruited. The ECG recordings (sampling rate of 1000 Hz, 5-minute long) were performed, then standard short-term HRV and SampEn were analyzed by software algorithms. Results: SampEn values from lead V1 in patients with persistent AF were significantly higher than those in healthy controls (0.14±0.02 vs. 0.10±0.04). Although there was no SampEn difference between PAF patients and the other three groups, the PAF SampEn was in between persistent AF and control values. For HRV analysis, low-frequency to highfrequency (LF/HF) power ratio in both PAF and persistent AF patients were significantly decreased compared to healthy controls (0.75±0.52 and 0.44±0.09 vs. 1.56±0.77, respectively). Conclusion: There was an impairment of cardiac autonomic function in both PAF (with normal sinus rhythm) and persistent AF patients consistent with an increased atrial signal irregularity.

BME-2012-066: Artifactual Component Classification from MEG Data using Support Vector Machine

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Keyword:
Magnetoencephalogram, MEG, support vector machine, independent component analysis, artifacts

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Abstract:
Recently, an independent component analysis (ICA) has been proven to be an effective method for removing artifacts and noise in multi-channel physiological measures. ICA can extract independent component (IC) which was directly regarded as artifacts. In this paper, we propose an automatic method for classifying physiological artifacts from magnetoencephalogram (MEG) data. The artifactual ICs were classified based on support vector machine (SVM) algorithm. The following parameters: kurtosis (K), probability density (PD), central moment of frequency (CMoF), spectral entropy (SpecEn), and fractal dimension (FD) were used as input vector of SVM. The proposed method showed the average classification rates of 99.18%, 92.33%, and 98.15% for cardiac (EKG), ocular (EOG), and highamplitude changes (HAM), respectively.

BME-2012-067: Examination of Temporal Characteristic of Sleep EEG Subbands Based on the Local Min-Max

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Keywords:
Electroencephalogram, sleep, temporal pattern, subband, local min-max.

Abstract:
In this paper, the temporal characteristic of spectral subbands of sleep EEG associated with different sleep stages is examined using a simple computational analysis technique based on the local minima and maxima. The average range of local min-max defined as the average differences between amplitudes of consecutive local minima and maxima is used as a temporal characteristic measure. From the computational results, it is observed that the sleep EEG epochs associated with different sleep stages manifest distinguishable characteristics of the average range of local min-max $R\lambda$ for various subbands. The computational results also show that the lower frequency subbands of sleep EEG associated with various sleep stages exhibit opposite temporal characteristic (the average range of local min-max) compared to the higher frequency subbands of sleep EEG. Furthermore, this suggests that the average range of local min-max may be a useful feature for sleep stage classification.

BME-2012-068: Prediction gait during ascending stair by using Artificial Neural Networks

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Key words:
prediction, nonlinear autoregressive, neural network, EMG, gait.

Abstract:
Walking up or down stairs is an important activity for human lives. Gait pattern of this activity is as same as walking except the range of motion and phase of muscles activities. Many studies have been focused on behavior of this motion. Two cameras and electromyogram (EMG) are the applications used in this study and analysis the motion. To determine the relationship of the both data, it can be performed in many techniques but in this study used artificial neural network model. Nonlinear Autoregressive model with exogenous (NARX) input was applied to this study to define the relationship between the electromyogram of eight muscles and angular displacement of knee and ankle joints of both legs. The results show that the predicted data from NARX were similar to the measured data.

BME-2012-069: Simulator Sickness in Immersive Virtual Environment

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Keywords:
Virtual reality; immersive virtual environment; simulator sickness; simulator sickness questionnaire

Abstract:
The simulator sickness in immersive virtual environment was studied for future questionnaire improvement. The top four sickness scores are general discomfort, eyestrain, difficulty concentrating, and fatigue. These experimental results suggest future questionnaire for immersive virtual environment to concentrate on problems about eyes and seeing. Furthermore, the least four simulator sickness are burping, increase salivation, sweating, and stomach awareness. These sickness symptoms might be reduced to shorten future simulator sickness questionnaire.

BME-2012-070: Comparison of biomechanical study of sacroiliac fixation between screw with two types of washer

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Keywords:

Sacroiliac joint; Washer; Failure; Compression force

Abstract:

In the present work, compared the biomechanical behavior of the hemi-pelvis right, sacrum and effects to sacroiliac joint. Hemi-pelvis right, sacrum made of solid foam model. Sacroiliac joint disruption, the fracture was fixed using washer with either PSU washer or old washer. The whole hemi-pelvis right, sacrum was pressured to simulate closely the real life double-leg stance. The supporting jig were specially designed Hemipelvis right, sacrum were tested on an Instron testing machine. Eccentric compressive force from 0 until failure for failure test. The specimens were then submitted to force applied vertically at the sacroiliac joint. Relative the force at failure of the sacroiliac joint was measured and compare. The specimens fixed with PSU washer presented greater than old washer.

BME-2012-071: Reversible Watermarking Algorithm in Application for Medical Images

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Keywords:
Medical images, prediction error expansion, reversible watermarking, expanded variance means (EVM).

Abstract:
Medical images play a significant role in diagnosis at the present time. The diagnosis information is also important particularly in patient treatment data, the results and other confidential information which cannot be disclosed according to judgment and ethics. These data are exported with the images and will be protected generally. This article presents a highefficiency technique for hiding information in images that is reversible without loss. This algorithm has been tested on medical images from different modalities which are diverse in nature and structure such as computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) and ultrasound (US). In summary, our processes have been analyzed in many aspects, for the embedding data capacity and image distortion after embedding. The test results demonstrated the efficiency of our approach that could embed a large amount of data with low distortion.

BME-2012-072: Application of Direct Linear Transform for Calibration of Miniature Computed Tomography

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Keyword:

Miniature Computed Tomography, Direct Linear Transform, Camera calibration.

Abstract:

After the development of miniature computed tomography, the calibration is the first thing to do. In this paper, image processing was used for testing miniature CT. We got comprehended coordinates on a chessboard. Then entire data were computed by direct linear transform equation (DLT). DLT is famous equation for finding a real position of three-dimensional object form two-dimensional images in multi projections. Afterward, rotation metric and transition metric of a camera was calculated by DLT. These metric can describe about the circular structure of gantry, flatness of gantry plane and accuracy of rotation angle. These parameters are especially important in reconstruction of cross sectional images by Feldkamp algorithm. Stability of miniature CT helps to reduce the artifacts in the image so good quality x-ray images can be derived.

BME-2012-073: Hybrid Composite Material of Bombyx Silk fiber For Ankle Foot Orthoses: Morphology, Physical, and Mechanical Properties

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Keywords :
ankle foot orthosis, stroke patients, Bombyx silk fiber, composite material, fiber reinforce composites.

Abstract:
Ankle Foot Orthoses (AFOs) are designed for neuromuskuloskeletal disorders. This study evaluated morphology and mechanical properties; tensile strength and hardness. Such properties of the ankle foot orthoses materials were used as a guideline for othoses fabrication. Ankle foot orthoses were produced into fiber polymer composite by lamination technique. Definitive laminated ankle foot orthoses silk fiber with resin had a higher specific tensile strength than carbon and glass fiber polymer composite. Hardness and elongation at break of is comparable to carbon and glass fiber polymer composite. Furthermore, the morphology of silk fiber composite showed that silk fibers adhere with resin better than carbon fibers and glass fibers. Significantly, as physical and mechanical properties and morphology, silk fiber composite promises to be an alternative material for Ankle Foot Orthoses.

BME-2012-074: 3D Finite Element Analysis for Coronary Artery Disease Therapy by using Microwave Ablation

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Keyword:
3D Finite Element Analysis, Coronary ArteryDisease, Microwave Ablation.

Abstract :
This paper presents three-dimensions finite element analysis of 2.45 GHz microwave ablation for plagued coronary artery treatment. Any narrowing or blockage of the coronary arteries reduces blood supply to the heart tissue, following by reducing an amount of delivered oxygen and nutrients. This phenomenon inhibits a normal function of the heart muscle. In this research, we propose an application of finite element method to analyze and simulate a microwave ablation process on the blockage or plagued coronary artery. The investigation emphasizes on a reduction of plague or fat size that fixed around a coronary wall when heating by microwave thermal ablation. The simulation results of 3D analysis show the characteristic of temperature distribution in the coronary artery and a destructive area of plaque. 10 Watts of emission power at temperature 95 °C is used as a preliminary value. The simulation found that 3.21 mm3 of plaque size can be destroyed with 10 s. These obtained results usefully guide us to develop and more investigate on a further system in the future.

BME-2012-075: A Simply Fall-Detection Algorithm Using Accelerometers on a Smartphone

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Keyword:
Fall detection, accelerometer

Abstract:
Every year, several thousands of elderly people experience with falling accident. Falling is then a main problem about healthiness of elders. This paper tries to find out a simple algorithm to detect a fall. With less calculation, the device can quickly distinguish between a fall and a normal activity of daily living (ADL). As the smartphone technology is currently in very advance, it includes several sensors to come along. The sensors building in the smartphone are very useful in every field of measurements even in medical engineering. The tri-axial accelerometer is one sensor available on the smartphone and one application is to use for fall detection. From the study, the simple algorithm can be applied for fall detection by observing any change of x-, y-, or z-acceleration 10g within time limited obtaining from ADLs in terms of lying down. The advantages of using the smartphone as a fall detector are that it can alarm or call out for help. It is also getting cheap, widely used, and comfortable to use or mount.

BME-2012-076: Wireless Intelligent Fall Detection and Movement Classification using Fuzzy Logic

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Keyword:
Fall detection, fuzzy logic, movement classification, triaxial accelerometer, Zigbee technology.

Abstract:
Global population aging leads to increased interests in preventive healthcare technology. As falls are the most common cause of injury or death in old persons, fall detection and movement classification is one of the key topics in this research area. In this paper we propose a simple wireless intelligent system prototype for fall detection and movement classification for real-time monitoring of the elderly. The portable sensor unit acquires data from a triaxial accelerometer and sends the data wirelessly to a computer using Zigbee technology. Alternative to classic methods, the movement data is analyzed using a fuzzy inference system. The system is designed to distinguish between four movement types: standing, sitting, forward fall, and backward fall. Its classification accuracy is investigated using experimental data. It is observed that the system performs well with high sensitivity and excellent specificity. Additionally, the system is applicable for monitoring rehabilitative patients and is extendable to a larger class of movements and postures.

BME-2012-077: Analysis of Heat Transfer and Specific Absorption Rate of Electromagnetic Field in Human Body at 915 MHz and 2.45 GHz with 3D Finite Element Method

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Keywords:
Finite Element Analysis, Electromagnetic Field, SAR, Heat transfer, Human Body, Microwave Hazard

Abstract:
This paper presents 3D finite element analysis for heat transfer and specific absorption rate of electromagnetic field in human body at 915 MHz and 2.45 GHz. The purpose of this research is to study the effects and harmfulness of leakage electromagnetic field to organ in living tissue. We propose a simulation of microwave radiation by using a finite element method (FEM) to our system for studying heat transfer and specific absorption rate of electromagnetic field in multi-organs living tissue. Electromagnetic wave distribution source in our system was designed as a microstrip type and placed at 5 cm from multi-organs living tissue model. As a preliminary, leakage power was assumed at 100 W and exposure time was 1800 s. The result from finite element method show distribution of electromagnetic field in 3D air space of multi-organs tissue model , specific absorption rate (SAR) and temperature. The SAR value will be followed the standard of ICNIRP (1998) and the results at 915 MHz and 2.45 GHz shown that maximum temperature in organs are different if frequencies different, in 3D model can be obtained every point of view and benefit for development protection system in near future.

BME-2012-078: Heat Transfer Efficiency Analysis of Infant Radiant Warmer by 3D Finite Element Method

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Keywords:
Finite Element Method (FEM), Infant Radiant Warmer, Neonatology, Heat Transfer

Abstract:
This paper presents heat transfer from infrared element source from infant radiant warmer. The principles of thermal radiate using three-dimensional finite element methods is show the efficiency and effect of Infant radiant warmer. In the design of the system has to model the underlying reality of the infant radiant warmer are used for Simulation results were similar to reality as possible. The simulation results of thermal radiation from the infrared lamp to mattress by using the three-dimensional finite element methods simulation as

close to the true result. The results come in the form of temperature, temperature gradient and the direction of heat radiation into the mattress. The result can be that the effects of radiation on the skin of newborns using infant radiant warmer treatment. The results of the analysis of the principle of three-dimensional finite element methods then try to make it easy to design infant radiant warmer effective for use with newborns up.

BME-2012-079: Performance Evaluation of Electroencephalograph with Negative Capacitance Converter

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Keywords:
hf-EEG, HFOs, SEPs, negative capacitance.

Abstract:
Spontaneous electroencephalogram (EEG) and evoked potentials measured from the scalp are considered to be attenuated by impedance of mediated biological tissues such as skull, biomembrane and cortex. Voltage loss at these tissues may deteriorate the measured signal. In this study, we explored a possibility that an electroencephalograph bearing enhanced inputimpedance could detect more sensitively the short latency somatosensory-evoked potential (SEPs) and high frequency oscillations (HFOs) in SEPs. We introduced a negative capacitance converter (NCC) into the electroencephalograph at front end. We expected the NCC to reduce floating capacitance in shielded wires between electrode and the electroencephalograph, and consequently to enhance the input-impedance of the device

especially in higher frequency region. SEPs and HFOs were measured in eight subjects with the proposed device and compared with those measured with a commercial electroencephalograph. Seven of eight showed larger amplitude of SEPs when EEG measured with the proposed device, but only 4 out of 7 showed larger amplitude of HFOs.

BME-2012-080: Optimal monitoring point for temperature and power control in microwave ablation system by using FEM

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Keywords:
component; Monitoring point, Temperature and power control, Microwave ablation , Finite Element Analysis

Abstract:
This study presents an optimal location of monitoring point for using by PID system to control temperature and output power of hepatic cancer microwave ablation system. We investigated a relation between output power and treatment time in hepatic ablation. A simple simulation model was adapted from COMSOL FEM solver. As a preliminary, monitoring point was supposed to place at 0.5 centimeter besides ablation probe. The simulation results shown that temperature at this monitoring point is linearly related to output power and treatment time.

BME-2012-081: 3D Finite Element Analysis of Heat Transfer Efficiency in Double Wall Infant Incubator

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Keywords:
3D finite element analysis, double wall infant incubator, heat transfer

Abstract:
This paper presents a study of heat transfer efficiency in double wall infant incubator by using 3D finite element method. Double wall infant incubator was modeled by using general CAD program then FEM analysis was implemented based on heat transfer and fluid dynamic principle. Real temperature measurement also performed to validate our simulation by using a general infant incubator and an infant incubator analyzer. Real experimental data at each 4 monitoring points and simulation data provide a small difference in temperature. In the future work, infant model should be included into our incubator in order to estimate a heat source effect from newborn baby.

BME-2012-082: Analysis of Heat Sink Effect in Hepatic Cancer Treatment Near Arterial for Microwave Ablation by using Finite Element Method

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Keywords:
component; finite element analysis, microwave ablation, hepatic arterial, heat sink effect, hepatic cancer

Abstract:
This paper presents an analysis of heat sink effect in hepatic cancer treatment near arterial vessel for microwave ablation by using finite element method. We analyze the temperature distribution, Specific Absorbtion Rate (SAR) and coagulation area in two models. The first is hepatic tissue without artery and the second is hepatic tissue with artery. In the second model, we specify distance between antenna and artery at 10 mm. The initial condition is set as power at 50 watts, temperature at 37 °C and blood perfusion rate is varied at 6.4 × 10-10, 6.4 × 10-3 and 6.4 × 104 1/s. The simulation results by using three-dimensional finite element analysis show that the temperature distribution in case of hepatic tissue with no artery is larger than the case with artery. We also found that blood perfusion rate affects to the temperature distribution in hepatic tissue. Higher blood perfusion rate, higher heat sink effect occur.

BME-2012-083: Finite Element Analysis for Severe Asthma Therapy at the Airway Smooth Muscle by Radiofrequency Ablation

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Keywords:
Radiofrequency Ablation, Severe Asthma Therapy, Airway Smooth Muscle, Finite Element Analysis

Abstract:
This paper presents a three-dimensional finite element analysis for severe asthma therapy by using radiofrequency (RF) ablation. We study a solution for severe asthma treatment by using radiofrequency ablation method. Severe asthma patients have breathlessness symptom, coughing, and wheezing that influence a daily life of patients. In case of severe asthma, patients have breathlessness symptom, coughing, and wheezing all the time. All symptoms cause to die. Severe asthma therapy by using radiofrequency ablation is a new alternative maneuver to the patient and hopefully may extend his lifetime, reduce using of medicines in asthma treatment and also save money on medical care in long run. The research results obtained from our three-dimensional finite element analysis show temperature distribution for airway dilation and increasing airway wall dimension by using radiofrequency ablation technique significantly. These results also guide us to develop an advance asthma treatment in the future.

BME-2012-084: 3D Finite Element Analysis for Varicose Vein Therapy by Using Microwave Ablation

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Keywords:
Varicose Vein, Finite Element, Microwave Ablation, Antenna

Abstract:
This paper presents three-dimensional finite element method for analyze a varicose vein microwave ablation. Varicose vein can contract by using heat from microwave ablation. Because of varicose vein patients have leg pain from long time standing, and do a lot of activities. Symptoms have influenced the daily life of patients. We study method for varicose vein therapy by using microwave ablation. Because of this method is easy to use for varicose vein therapy. In this research work, we propose simulation varicose vein that varicose vein is inserted with antenna into blood vessel. Simulation method delivers microwave to antenna inserted in varicose vein. For this reason, varicose vein is contract. Finite element analysis can apply in treatment planning and show temperature distribution and specific absorption rate (SAR) distribution for contract of varicose vein characteristic by using microwave therapy. And the doctor can be use the data for treat in future.

BME-2012-085: Spike and Epileptic Seizure Detection Using Wavelet Packet Transform Based on Approximate Entropy and Energy with Artificial Neural Network

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Keywords:
EEG Signal, Spike, Epileptic Seizure, Wavelet Packet Transform, Approximate Entropy, Energy

Abstract:
This paper proposes the method that can detect both spikes and epileptic seizure at the same time based on wavelet packet transform, approximate entropy and energy, and artificial neural network. First, the EEG signals are decomposed into 4 levels, 16 frequency sub-bands, using Daubechies for mother wavelet to distinguish the usable signal. Then the approximate entropy and energy features are extracted for each sub-band to form the feature vector. Finally, the constructed feature vector is used as an input to the artificial neural network to classify the EEG signal s into 6 types of spike, epileptic seizure, eye closed, eye opened, body movement, and normal signal. The experimental results show that the proposed method identified and classified the EEG signal with average sensitivity of 76.55%, specificity of 81.3%, and accuracy of 89.47%.

BME-2012-087: Constitution and Phase Analysis of Alpha Waves

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Keywords:
Alpha waves, Signal processing, ICA, Fourier descriptor, Clustering, Phase analysis

Abstract:
Alpha waves are electroencephalogram discovered by Hans Berger in 1929 and have been studied by many researchers. Recently the amplitude and the phase of alpha waves attract attention, and various studies are reported. So far the alpha waves are not concretely modeled to explain how they are constituted. In this paper, we analyze the phase of alpha waves for their future modeling. As pre-processing, we extract alpha wave data from EEGs and divide the data into alpha wave constituent waves. Analyzing the feature quantity of the alpha wave constituent waves, it turns out that the amplitude and the wavelength of alpha wave constituent waves are correlated with a constant time delay.

BME-2012-088: Development of a 3D Reconstruction of Blood Vessel by Positional Calibration of Ultrasound Probe

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Keywords:
reconstruction, blood vessel, metal ball, calibration, .

Abstract:
We have ever developed the method to realize active path selection of microbubbles at the

bifurcation of blood vessel by introducing acoustic radiation force to focus the density. To apply this method to an in vivo experiment, it is necessary to understand the three-dimensional shape of blood vessel and the distribution of bifurcations. Therefore we have developed a method to measure the distribution of bifurcations in blood vessel by positional calibration of the ultrasound probe with the extraction of blood flow in echograms. We used a metal ball marker for calibration. The shape of blood vessels is reconstructed in a graphical interface, where three-dimensional thinning algorithm was applied. This system helps the examiner to adjust the acoustic field for ultrasound therapy using microbubbles.

BME-2012-089: Very Short Term Measurement of Root Growth with Magnified Time-Lapse Image Capture System

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Keywords:
Growth rate, Electric field, R.sativus

Abstract:

To date, various kinds of electric responses of animal have been reported. Galvanotaxis of paramecium and electric stimulation of neuron or muscle of vertebrate are well studied. On the contrary, there are few reports on the responses of plant to electric stimulation. R.sativus and E.camaldulensis are among them. In our previous study, root growth of Eucalyptus seedling seems to enhanced by 20% in 50Hz a.c. electric field of around 50 V/m range. However, standard deviation of the data was so large that reliability about electric root growth enhancement was difficult to demonstrate clearly. To make a precise measurement, averaging in an ensemble is needed. However, effect of individual difference is inevitable in the experiment. In this study, we developed a magnified time-lapse image capture system to measure the root growth in a short period of time. This system enables growth measurement in very short time compared with some days long. We investigated the resolution and the accuracy of the system rapid growth measurement. The maximum resolution of the system was less than 4μm. The root length of the R.sativus, whose growth enhancement in electric field was well established, was mesured. From the result of 2 hour measurement, root growth measurement with 10% standard deviation in 5 minutes was demonstrated. This figure means the new system enables over 800 fold faster measurement with better accuracy.

BME-2012-090: Development of Bone Mineral Density and Bone Mineral Content Measurements System Using a Dual Energy X-ray

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keywords:
BMD, BMC, Dual energy x-ray

Abstract:
This paper presented a design of a bone mineral density (BMD) and bone mineral content (BMC) measurements system. The main components consist of an outer structure with lead sheet for x-ray protection, x-ray source controlled by microcontroller, CCD-type x-ray detector, detector controller, and computer program for devices control. The acquired x-ray image is sent to PC for image processing. The bone mineral density and bone mineral content measurement is based on dual energy x-ray absorptiometry. The concept of dual energy x-ray is adopted to estimate the BMD on the finger bone. The preliminary results are fairly promising.

BME-2012-091: Attentional and emotional tasks: gender differences in heart rate variability detected by short-term detrended fluctuation analysis

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keywords:
heart rate variability (HRV), detrended fluctuation analysis (DFA), attentional task, emotional task.

Abstract:
In this study we analyzed the heart rate variability of 21 subjects, 12 females and 9 males performing a two-step task. The subjects were requested to watch a relaxing movie for 30 minutes and, in a different day, to watch a stressful movie again for 30 minutes. The electrocardiographic signal was recorded for all the duration of the sessions. The series of the beat-to-beat time intervals were analyzed by detrended fluctuation analysis. The short-term variability index clearly indicated a significant gender difference independently of the specific movie, while the long-term variability index did not reveal any significant difference of gender and task. This finding contrasts with the results of physical stimulation, which abolishes the gender differences observed in resting conditions. The discrepancy may depend on lower autonomic engagement in cognitive/affective than in physical tasks as well as on a possible different balance of the sympathetic and parasympathetic activities.

BME-2012-092: Fabrication and evaluation of implantable pressuresensor using strain gauge

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Keywords:
Polydimethylsiloxane (PDMS), Polyethylene terephthalate (PET), Strain gauge, Polymeric diaphragm pressure sensor, In-vivo, Bladder pressure.

Abstract:
In this study, we demonstrate a simple fabrication of polymeric diaphragm pressure sensors by utilizing a commercial thin-film strain gauge embedded in the diaphragm. Two different polymeric materials, polydimethylsiloxane (PDMS) and polyethylene terephthalate (PET), are employed to show the feasibility of the sensors by comparing the performances, sensitivity, linearity, and device long-term stability. To characterize the fabricated pressure sensors, we design a dynamic pressure characterization system operating in either compressed air or water environments with a programmable temperature control. Experimental results show that the pressure sensitivity of PET pressure sensors is about 2.5 times better than that of PDMS pressure sensors and the pressure sensitivity in water is similar to that in air for both PET and PDMS pressure sensors. Moreover, significant degradation of the output signal of PDMS diaphragm pressure sensors is observed over time in water operating condition. Finally the proposed pressure sensor is verified for biomedical applications by performing in-vivo test monitoring the rabbit bladder pressure.

BME-2012-095: Lossless Compression of Electromyographic Signal

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Keywords:
Electromyography, Data compression, Bruxism, Lossless compression

Abstract:
For long-term electromyographic (EMG) signal acquisition, data compression can be used to reduce the original data to a smaller size. This reduction decreases the bandwidth and energy used during transmission. Storing the compressed data on storage media also uses less space. This study aims to determine suitable lossless compression algorithms for EMG signal on small embedded devices. These devices have much less processing power than laboratory-sized devices thus a proper tool has to be carefully chosen. Various algorithms are studied with a set of simulated and real EMG signals. The performances of the algorithms are measured and compared. The memory requirement of the algorithms are also recorded for future reference. The result shows that the LPC based algorithms performs very well with EMG signal. The average compression ratio of these tools are 2.44 . While BWT and LZMA algorithms are comparable to LPC in term of CR, these tools are very complex and have a much higher resource requirement. In this study, FLAC outperforms other compression tools with average CR of 2.61. This tool is fast and consumes slightly more resource than a much simpler scheme like SHN. For the standard LPC modeling, choosing an order of the model greater than 4 produces insignificant benefit. The simpler SHN scheme performs 4.2% better than the best LPC.

BME-2012-096: Miniature Computed Tomography with Vertical Rotating Gantry: Application for 3D Modeling

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Keywords:

Miniature computed tomography, Fladkamp conebeam, back projection image reconstruction, 3D Modeling

Abstract:

Miniature computed tomography system with vertical rotating gantry is presented in this paper. System calibration was performed before achieving the projection data. An object placed on platform was exposed by the camera every one degrees of rotating angle. Thus, 360 projection data were performed in this study. Finally, Feldkamp algorithm based on a 3-D filtered back projection was employed to reconstruct cross sectional images. The result shows that 3-D model images and volume-rendering obtained from our miniature computed tomography were satisfactory. In conclusion, the miniature computed tomography presented in this study is capable to construct 3-D model with an ease technique.

BME-2012-097: Urine Sediment Image Segmentation based on Feedforward Backpropagation Neural Network

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Keywords:
Urine sediment, Image segmentation, Artificial neural network, Feedforward backpropagation.

Abstract:
The appearance of crystals, casts, red blood cells, white blood cells and bacteria or yeast in urine sediment is a major clinical significance. It provides important information for both diagnosis and prognosis. However, low contrast against the background, less illuminating environment and an existent of complicated components on the microscopic urine sediment image need more sophisticated method to analyze. In this paper, we present a conventional method to segment the urine-sediment visual component by using feedforward-backpropagation algorithm of neural network. Background color was used as a main feature in the segmentation process. Experimental result shows that our proposed method provides quite satisfactory segmentation.

BME-2012-099: Computational Fluid Dynamic (CFD) in Thai Patient with Obstructive Sleep Apnea Syndrome (OSAS)
A Case Report: Comparative Study Between Healthy and OSA Subject.

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Keywords:
CFD, obstructive sleep apnea, airflow, simulation, treatment planning.

Abstract:
In order to investigate flow characteristics in upper airway, this study focuses on applied Computational Fluid Dynamics (CFD) with Obstructive Sleep Apnea Syndrome (OSAS) base on Computed Tomography images. OSAS has been remarked in the several decades because of its disturbance and severity that leading to a serious morbidity and excess mortality in long-term consequences such as heart attack and strokes. Although numerous methods have been advocated for treatment an OSA syndrome, no single procedure employed effectively.

To investigate the airflow behavior, three-dimensional airway models during tidal breathing has been performed in a patient with obstructive sleep apnea and one control. Segmentation was carried out from CT data initially. Then, the volumetric surface was performed by reverse engineering process and mesh generation was operated after that. Computational modeling for inspiration was operated by employing k-ω SST turbulence model. For comparison the airflow characteristics, streamline, velocity, pressure, and wall shear stress either of models were illustrated. For patient associated with OSA, Particularly in oropharynx region, velocity significantly increase and negative pressure greater than the control one because of narrower airway. Furthermore, WSS manifestly rises up in stricture area. In brief, The CFD analysis could be employed to evaluate the airflow in OSA patients as an alternative technique for diagnosis and treatment planning.

BME-2012-100: Knee Angle Prediction during Stair Ascending Gait of Trans-Femoral Amputee Neural networks application

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Keywords:
Knee angle, Stair Ascending gait, Trans-femoral amputee

Abstract:
For the Trans-femoral (TF) amputee, the biomechanics of stair gait can be analyzed in only the stair descending. The information of stair ascending gait can be evaluated for only the normal side. The study with TF amputee mostly referred to the stair ascending by leading with the normal side rather than the prosthetic side as there was none of prosthesis can be the leading side to climb up the stair so none of TF amputee can make the step over step climbing up the stair. Since there was none of prosthesis can be the leading side to climb up the stair, none of TF amputee can make the step over step climbing up the stair and hence none of the stair ascending gait prediction model has been studied in transfemoral amputee, this study is aiming to figure out the stair gait ascending pattern in transfemoral amputee which imitated by the healthy person. Then, the neural network model is constructed to predict the knee angle during stair ascending, in which purpose to integrate into the controller of the prosthetic knee component to assist the stair ascending gait

BME-2012-101: EMG Classification Using The Second Order Volterra Series

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Keywords:
EMG; Neural Network; Volterra series;

Abstract:
This paper studies about electromyography (EMG) classification. The application of EMG classifier is used for prosthetic control. A Volterra series was propose in this works, we used 2nd order series for processing EMG signal. This work had compared between filtered EMG and 2nd Volterra EMG in artificial neural network (ANN) model. The result show the classification with 2nd Volterra EMG has more accuracy than filtered EMG. The future works is to develop the Volterra-Neural networks (V-NN) model for EMG classifier.

BME-2012-110:Thai-Australian Biomedical Engineering Collaboration in Development of a Blood Collection Monitor

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Keywords:
Blood Collection Monitor, Medical Devices, Collaborative Biomedical Engineering, Thailand-Australia Research Collaboration.

Abstract:
A case study is presented involving the early stage of a collaborative Biomedical Engineering project between Thai and Australian researchers. The case study involves development of a blood collection monitor intended potentially to fill the needs of Thai hospitals. Results of developing this medical device were found from particular experiments.

BME-2012-111: An Ultrasound Imaging System Prototype for Raw Data Acquisition

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Keywords:
Data acquisition, hardware, pulse, raw data, ultrasound imaging system.

Abstract:
This paper presents a hardware design of an ultrasound imaging system for transmitting pulses and acquiring echo signals to/from individual elements of an array transducer. Since most of the ultrasound imaging systems in the market provide only image files after

reconstruction, the presented hardware can be controlled by a computer in order to transmit pulses in specific patterns to transducer elements and in order to access the data from individual transducer elements. It benefits the research and development of new algorithms forbeamforming, image reconstruction, and other applications, such as elastography and ultrasonic transmission tomography.

BME-2012-112: Myocardial Iron Measurement in Thalassemia Using Cardiac Magnetic Resonance Image Processing Software

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Keywords;
Cardiac image processing, Cardiac T2*, Iron overload, Thalassemia

Abstract:
To assess the iron overload in human tissue especially in the heart of transfusion-dependent thalassemia patients using cardiac magnetic resonance imaging (CMRI) technique has been widely used to evaluate cardiac iron deposition because of its non-invasive procedure. The iron measure from this technique is represent as T2* (T2 Star) value. Cardiac T2* software was developed. The software was measuring T2* value from DICOM image with two algorithm processing components; regions of interest (ROI) identification, and T2* optimization. The software preliminary testing was performed using test cases DICOM image, three times repeating, from both healthy volunteer and thalassemia patient with cardiac iron overload, then compared T2* value with the reference tool (CMRtools with ThalassemiaTools plug-in). Mean T2* value analyzed from healthy volunteer CMRI was 22.36 (±0.94) and 37.10 (±1.62), respectively. While the mean T2* value analyzed from thalassemia patients CMRI was 15.52 (±0.85) and 18.67 (±1.15) in reference software and CMUT2Star software respectively. In conclusion, CMUT2Star produced a higher T2* value than the reference tool. Software has no any errors and no conflict with testing platform. The algorithm in T2* optimization component need to be adjusted in order to produce the accuracy and robust T2* value.

BME-2012-113: Capacitive sensors for Detection of the Movement Artifacts in Active Capacitive Electrocardiography Electrodes

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Abstract:
A capacitive sensor system is integrated into an active capacitive ECG electrode. This system provides a signal, which is correlated with movement artifacts during ECG signal acquisition, and can be used as reference signal in an adaptive filter.

BME-2012-114: Hybrid Architecture of a DAC for Neurostimulation

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Keywords:
neurostimulation; electrical stimulation; stimulation waveform; current stimulation; dac; current steering.

Abstract:
Electrical Neurostimulation has been effective for treating and reducing symptoms of neurological diseases, for alleviating some types of chronic pain and for restoring sensory or neuromuscular deficits. Because of the energy and size limitation on fully implantable devices, it is important to keep devices small and at low power. It was already demonstrated that non-rectangular waveforms provide a more energy-efficient neural stimulation. In this article is shown how a hybrid architecture of current steering DAC is suitable to this application, because of its specifications: the ability to convert several waveforms directly from digital to analog current signals, low power consumption, small chip area requirement, the capability of sharing common stages and also for its simplicity. An ASIC has been developed composed of four stimulator channels, capable of driving several current waveforms. The design is implemented in 130 nm CMOS technology.

BME-2012-115: Effect of experimental factors on the properties of PEDOT-NaPSS galvanostatically deposited from an aqueous micellar media for invasive electrodes.

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Keywords:
Charge injection, critical micellar concentration, impedance, invasive electrodes, PEDOT.

Abstract:
Poly(3,4-ethylenedioxythiophene) (PEDOT) coat for invasive electrodes has been generated considerable interest in terms of electrical properties and biocompatibility. Adequate formulations and methodology are necessary to deposit polymer reproducibly on macro and micro-electrodes. Electrochemical properties of PEDOT as interface material were assessed with respect to different experimental factors. PEDOT/NaPSS was polymerized from a sodium polystyrenesulfonate (NaPSS) dispersion. The dispersion was characterized by cyclic voltammetry and its critical micellar concentration (CMC) value is reported, according to our best knowledge, for the first time for PEDOT deposition. The polymer obtained was studied using Raman spectroscopy, impedance and cyclic voltammetry measurement. PEDOTNaPSS coat shows high charge injection (Qinj), low interfacial impedance (Z) and superficial chemical stability (Raman). This study provides a simple, constant and reproducible framework to coat invasive electrodes.

BME-2012-116: A New Content-Based Medical Image Retrieval System Based on Wavelet Transform and Multidimensional Wald-Wolfowitz Runs Test

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Keyworts:
wavelet transform, k-mean clustering algorithm, Wald and Wolfowitz runs test

Abstract:
Recently, one of the authors proposed a new similarity measure, called weighted multidimensional Wald and Wolfowitz (MWW) runs test, for the content-based color image retrieval system. The algorithm outperforms conventional similarity measures for comparing two color images. In this paper, we propose a new content-based medical image retrieval system based on discrete wavelet transform (DWT) symlet and the weighted MWW runs test. The DWT is used to extracted texture features of the medical images. The weighted MWW runs test is used to compare distributions of texture features of two medical images. Our experiments were performed on 1,000 medical images from image retrieval in medical applications (IRMA). The experimental results show promisingly efficient to retrieve the medical images.

BME-2012-118: A Mammography Database and Viewer System

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Keywords:
Mammography, DICOM viewer, web-based, PHP, MySQL.

Abstract:
A Mammography Database and Viewer System have collected and stored mammography images of Thai women, treated at the Radiology Department of Hospital in Rangsit,

Pathumtani, Thailand, constructed a database using the digitized mammography images, and developed an image viewing system to display these digital mammograms. The images are stored with the high resolution Matrox Morphis (MOR/2VD/84*) framemgrabber board. The digital mammography database is powered by MySQL and PHP. It also has a web-based search engine (with secure access) so that the information can be made accessible to all medical team members. The image viewing software, DICOM Viewer, is coded in Borland C++ Builder and is intended to help medical professionals view and retrieve large data sets in near real time. This have already digitized 200 cases (one case per patient, twenty to forty images per case). The system also have developed a MySQL-based image database, and a PHP-based web-search engine to retrieve cases that have masses (benign or malignant) or calcifications (benign or malignant). This database has been evaluated by medical professionals and the experimental results obtained so far are very promising (high image qualities, fast access time). The system are currently developing an image content-based retrieval function for the database system in order to provide improved search capability for the medical professionals.

BME-2012-119: Mammographic Masses Segmentation Based on Morphology

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Keywords:
Segmentation, morphology, mammography.

Abstract:
Medical images segmentation is an important work for object recognition of the human organs and it is an important pre-processing step in medical image segmentation and 3D reconstruction. Conventionally, segmentation is detected according to some early brought forward algorithms such as gradient-based algorithm and template-based algorithm, but they are not so good for noise medical image segmentation. In this paper, basic morphological theory and operations are introduced at first, and then a novel morphological segmentation

algorithm is proposed to detect the segment of mammographic masses with salt-and-pepper noise. The experimental results show that the proposed algorithm is more efficient for medical image denoising and segmentation than the usually used template-based segmentation algorithms and general morphological segmentation algorithms.

BME-2012-120: Diagnosis of Conductive Hearing Loss using Template Matching Method

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Keywords:
Pneumatic otoscope, tympanic membrane movements, template matching, umbo.

Abstract:
The movement of tympanic membranes can be evaluated with a video pneumatic otoscopy using otoendoscope and video apparatus. The umbo position was analyzed using template matching method when the pressure inside of it was static, positive and negative, respectively. The template matching method was used to track and measure the movement of tympanic membranes automatically. This method is more comfortable in uses, more accurate and precision compare with manual method. Moreover we can reduce the analysis time and improve the objectivity of measurement with the proposed method.

BME-2012-121: EEG-based Mental Fatigue Prediction for Driving Application

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Keywords:
Mental fatigue, Electroencephalogram, EEG, Electrooculogram, EOG

Abstract:
Mental fatigue prediction using the electroencephalogram (EEG) has widely been studied. EEG definitely changes when one feels fatigue. However, the challenge is that the accurate results of fatigue prediction are from how to select the EEG interval of interest for real-time prediction. This paper proposes a novel method for efficiently selecting the EEG signal during fatigue period. Eye-blinking (EB) signs detected via the electrooculogram (EOG) are employed as the marker. The EEG band powers are further extracted as the features. The results illustrate that the proposed marker is possible to be efficiently used to predict the mental fatigue state in real-time.

ωBME-2012-122: On the Development of EEG based Emotion Classification

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Keywords:
Electroencephalogram, EEG, Emotion

Abstract:
This paper proposes an investigation on classification of the positive and negative emotions via the use of electroencephalogram (EEG). EEG bandpowers are extracted as the feature of interest. Two simple decision rules to classify positive and negative emotions are proposed, i.e. 1) using both the left and right frontal information and 2) using only one side of the left or right frontal information. First decision reports low accuracy while the second decision rule can achieve higher accuracy between 80 to 90%. This can be concluded that the proposed method is possible for the realtime emotion classification in neuroeconomics.

BME-2012-123: Effect of musical tones in auditory perception analysis using nonlinear model

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Keywords:
fMRI; Music; Neural Network; ANFIS;

Abstract:
This paper studies the application of the non-linear model (ANN, ANFIS). ANN and ANFIS were used to fit a Blood- Oxygen Level Dependent (BOLD) signal with design architecture. A model proposes to define region of interest (ROI) in brain fMRI images. The result shows the ANFIS model can be represent to fit the BOLD data better than ANN. Three paradigms were stimulated at difference issue activation in specific parameter (activation time, duration and signal strength). In this case a higher frequency and amplitude paradigm has stimulated on the brain area activation faster and more frequently.

BME-2012-124: Low Cost Tablet Counting Machine

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Abstract:
This paper proposes a tablet counting machine based on image processing. A digital webcam creates an image of the pill being dispensed. This image is displayed in standard RGB model. The original image will be changed to grayscale image. The grayscale image will be filtered for noise using a median filter and then using the threshold process we obtain a digital binary image of the pill being dispensed. The image is further processed using erosion and dilation. The actual number of pill in the image is determined by applying connected component labeling and centroid processed. Our experiment used 6 mm. to 12 mm. samples with accurate results.

BME-2012-125: Design and Experimental Study of Electrochemical Detector with Ewod for Chemical Analysis

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Keywords:
component; Electrowetting on Dielectric (EWOD); Electrochemical detector, Digital Microfluidics

Abstract:

In this work, we describe design and experimental studies of a electrochemical detector by using electrowetting on dielectric (EWOD) digital microfluidics microchip for chemical analysis. For the design, the electrochemical EWOD digital microfluidics system consists of T-junction EWOD microchip for merging buffer reagent and analyte droplets and three internal electrochemical detector at the end of T-junction. Three electrodes consist of Au working, Au reference, and Au auxiliary for rapid chemical analysis with minimal reagent consumption. In experiment, the single-plate EWOD microchip has been successfully fabricated and tested to study possibility of moving (merging and transporting) droplet on the microchip. For controlling droplet, we designed electrical circuits using a microcontroller to control relays that switching applied voltage to control electrodes on and off. Interfacing RS232 with microcontroller makes the droplet merging. Merging a droplet can be modified from personal computer by sending commands from a PC to a microcontroller. The tested results show that successfully move (merging) of deionized droplets along patterned single plate EWOD device by controlling of microcontroller.

BME-2012-126: Universal Nonuniform Sampling of ECG Signals: Opportunities and Obstacle

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Keywords:
Electrocardigram, Nonuniform sampling, Compressive sensing, Low-power ECG

Abstract:
Sampling of ECG signals has been studied for several decades. However, nonuniform sampling at low average rate has received much less attention. While uniform sampling rate needs to be at least twice the bandwidth of a signal (Nyquist rate), in theory, nonuniform sampling at sub-Nyquist rate should be adequate for faithful reconstruction if the signal is sufficiently sparse. Noting the known sparsity ECG signals, we attempt to demonstrate sub-Nyquist sampling of such signals. However, alongside this opportunity, reconstruction from nonuniform samples also poses a particular challenge. While uniform sampling admits universal (signal-independent) reconstruction (via sinc interpolation), reconstruction from nonuniform samples is generally data-dependent. In this paper, we make use of compressive sampling theory to demonstrate that nonuniform sampling does provide universal performance guarantee. In our experiments, we use ANSI/AAMI standard test ECG signals, and tune the orthogonal mathing pursuit algorithm for those to obtain superior performance. Our results potentially facilitates development of low-power ECG recording devices with potential application in remote locations without grid power.

BME-2012-127: Development of the Ultrasound Power Meter for Therapeutic Applications

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Keywords:
ultrasonic power measurement, radiation force balance, ultrasound metrology

Abstract:
The total output power from a medical ultrasound transducer has to be measured due to various reasons but in general they are related to patient safety and assessment of performance. The objective of this work was to develop an ultrasound power meter to measure a total output power from therapeutic ultrasound devices. The implementation of this work utilizes a radiation force balance technique based on the method recommended in the International Electrotechnical Commission (IEC 61161). Ultrasound therapy unit and its transducer were used as an ultrasonic source. To verify the performance of the developed system, the ultrasonic power measurement results from our developed ultrasound power meter were compared with those from the commercial ultrasound power meter (UPM) at 5 nominal intensity values (0.5 W/cm2, 1 W/cm2, 1.5 W/cm2, 2 W/cm2, 3 W/cm2) with three frequencies, 0.86 MHz, 2 MHz and 3 MHz, and four different output pulse modes; continuous wave (100% duty cycle), 1:2 (50% duty cycle), 1:5 (20% duty cycle) and 1:10 (10% duty cycle). The results show that the developed system is currently able to determine the ultrasonic output power in the frequency range from about 1 MHz to 3 MHz, and in the power range from 100 mW to approximately 15 W. Current efforts are being made to focus on testing the performance of the developed ultrasound power meter by comparing the results from the developed system with those from the standard system at the National Institute of Metrology, Thailand (NIMT) and developing a three axis positioning system with computer control for the alignment of the ultrasonic transducer.

BME-2012-128 : Resolution Improvements in Ultrasound Elastography Using Dynamic Focusing

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Keywords:
Axial resolution, dynamic focusing, elastography, lateral resolution, ultrasound.

Abstract:
During the past decade, signals from conventional focusing schemes with one or a few focal depths have been used in ultrasound elastography. Echo signals from transducer elements have been delayed and summed coherently only at the focus depths, therefore, elastograms reconstructed from these signals could have limited resolution at the area far away from the focal depths. In this work, dynamic focusing has been used to beamform the echo signals before elastographic reconstruction. The axial and lateral resolution of the elastograms were observed and compared to those reconstructed from the conventional focusing scheme with one focal point. Phantoms with two small hard inclusions at different depths were simulated using finite element method and the echo signals were simulated from these phantoms. The results show that the axial and lateral resolutions of the elastograms were improved after using dynamic focusing scheme.

BME-2012-129: Measuring Cognitive Abilities and Resting-State Neuromagnetic Signals in Children

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Keywords:
Magnetoencephalography, Resting-state brain activity, Non-linear analysis, Development, K-ABC

Abstract:
Resting-state study is a useful tool to investigate the brain activity related to cognitive abilities in children because it may be difficult for children to perform some experimental tasks. In the present study, we report a preliminary examination to associate the resting-state neuromagnetic signals from magnetoencephalogram (MEG) with cognitive abilities in children. We applied a non-linear time-series analysis for 90-s resting-state neuromagnetic signals and estimated interdependency of two channels of MEG signals. Then we examined the relation between the magnitudes ofinterdependency and the cognitive abilities and ages. Although we found some indications of age differences in the lateralization of interdependency, the results highlighted several limiting factors in measuring cognitive abilities and resting-state neuromegnetic signals in children and suggested that furtherelaboration of devices, procedures, and analysis would be warranted.

BME-2012-130: The preliminary study of lactate detection based on lactate dehydrogenase/nictotinamide adenine dinucleotide

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Keywords:
Lactate detection, Lactate dehydrogenase, Amperometric lactate biosensor

Abstract:
This study reports the preliminary development to biosensor using electrochemistry for lactate analysis. In this work, PEDOT/PSS modified screen printed carbon was developed as working electrode with lactate dehydrogenase (LDH), the oxidized form of nicotinamide adenine dinucleotide (NAD+) and glutaraldehyde. The result shows that the current from working electrode with PEDOT/PSS were higher compared with screen printed carbon electrode. These results were consistent with PEDOT/PSS properties that are conducting polymers and can help for more rapid electron transfer. These favorable characteristics allowed its application to detect normal blood lactate concentration in human beings.

Conference Banquet and Research Networking Event

BMEiCON 2012 organizing committees are glad to announce that the BMEiCON 2012 banquet will be held at Arawan Riverside Hotel in Pakse, Laos (http://www.arawanhotelpakse.com/index.php) at the evening of December 6th, 2012. At the conference banquet, the participants will be welcomed with the traditional welcome ceremony and impressed with traditional dances and performances. Also, there will be a keynote speech at the banquet.

On the next day, December 7th, 2012, the participants will join in the research networking event in Pakse, Laos. The participants will visit key tourist attractions of southern Laos.

Laos, officially the Lao People's Democratic Republic, is located in the center of Indochina, sharing borders with Thailand to the west. Laos is a landlocked, mountainous country, widely covered by largely unspoiled tropical forest. Laos has become popular with tourists for its relaxed style of living and for retaining elements of the "original Asia" lost elsewhere. The best time to visit Laos is between November and April.

Highlights of the excursion trip for the research networking event includes:

- Observing a breathtaking scene of the double waterfall at Tad Fane waterfall. The waterfall is located within the Dong Hua Sao, the National Biodiversity Conservation Area. The beauty of Tad Fane waterfall stems from the two branches of stream (Champi and Prakkoot) that are originated in the Bolaven plateau. The water drops about 120 meters.

Tad Fane waterfall (image source: http://goo.gl/C0cEI)

Tad Fane waterfall (image source: http://goo.gl/C0cEI)

- Being impressed by the large waterfalls at Pha Suam. This is another most spectacular waterfall in Laos. This beautiful and natural scenery also consists of a large stream and a number of islets. In addition, you will visit tribal village and see their lifestyle.

Pha Suam waterfall (image source: http://goo.gl/LDUZ2)

Pha Suam waterfall (image source: http://goo.gl/LDUZ2)

Laos tribal hut (image source: http://goo.gl/uepMm)

Laos tribal hut (image source: http://goo.gl/uepMm)

- Tasting local coffee and tea amid fields of coffee and tea at Paksong. Coffee and tea are ones of the most famous agricultural products of Champasak province of Laos.

A field of offee and tea (image source: http://goo.gl/JmE3H)

- Shopping at duty-free shops at Thailand-Laos border.

Local market (image source: http://goo.gl/RU6Wu)

Technical Program (Final)

BMECON 2012, 5-7 December 2012, Ubon Ratchathani, Thailand

Tuesday, December 4, 2012

16:00-18:00	Registration (Sunee Grand Hotel, Ubon ratchathani, Thailand)

Wednesday, December 5, 2012 (Day-1)

08:00-09:00	Registration			
09:00-09:30	Opening ceremony - Room Tubtim Siam II (5th Floor)			
09:30-10:00	Keynote speaker : Prof. Dr. Tsuyoshi Shiina			
10:00-10:30	Keynote speaker : Prof. Dr. Kazuhiko Hamamoto			
10:30-11:00	Coffee Break			
Session	Room Tubtim Siam II	Room Phatumwan	Room Phatummad	Room Phatumchart
Session Topic	D1R1ML-Imaging I	D1R2ML-Instrumentation	D1R3ML- Bioinformation I	D1R4ML-Health care Technology
Chair	Kohji Masuda	Atorn Sanpanich	Udomchai Techavipoo	Teerakiat Kerdcharoen
11:00-11:15	BME-2012-116	BME-2012-009	BME-2012-111	BME-2012-013
11:15-11:30	BME-2012-018	BME-2012-025	BME-2012-115	BME-2012-026
11:30-11:45	BME-2012-022	BME-2012-017	BME-2012-128	BME-2012-028
11:45-12:00	BME-2012-095	BME-2012-037	BME-2012-121	BME-2012-040
12:00-12:15	BME-2012-048	BME-2012-055	BME-2012-118	BME-2012-044
12:15-12:30	BME-2012-088	BME-2012-054	BME-2012-123	BME-2012-076
12:30-13:30	Lunch			
Session	Room Tubtim Siam II	Room Phatumwan	Room Phatummad	Room Phatumchart
Session Topic	D1R1AE--Imaging II	D1R2AE-Simulation I	D1R3AE-Bioinformation II	D1R4AE-Rehabilitation
Chair	Ekkarat Boonchieng	Pattarapong Phasukkit	Sumet Umchid	Warakorn Charoensuk
13:30-13:45	BME-2012-005	BME-2012-027	BME-2012-126	BME-2012-051
13:45-14:00	BME-2012-119	BME-2012-049	BME-2012-122	BME-2012-073
14:00-14:15	BME-2012-112	BME-2012-077	BME-2012-127	BME-2012-100
14:15-14:30	BME-2012-091	BME-2012-082	BME-2012-130	BME-2012-101
14:30-14:45	BME-2012-124	BME-2012-083	BME-2012-129	BME-2012-035
14:45-15:00	BME-2012-075	BME-2012-084	BME-2012-120	BME-2012-020
15:00-15:30	Coffee Break			
Session	Room Tubtim Siam II	Room Phatumwan	Room Phatummad	Room Phatumchart
Session Topic	D1R1AL-Signal I	D1R2AL- Health Education	D1R3AL- Biomechanic and Robotic	D1R4AL-Mis I
Chair	Pornchai Phukpattaranont	Wongwit Senawong	Seiichi Suzuki	Caillin Eastwood-Sutherland
15:30-15:45	BME-2012-050	BME-2012-059	BME-2012-063	BME-2012-038
15:45-16:00	BME-2012-019	BME-2012-041	BME-2012-089	BME-2012-043
16:00-16:15	BME-2012-053	BME-2012-113	BME-2012-021	BME-2012-010
16:15-16:30	BME-2012-065	BME-2012-060	BME-2012-070	BME-2012-087
16:30-16:45	BME-2012-066	BME-2012-081	BME-2012-092	BME-2012-034
16:45-17:00	BME-2012-071	BME-2012-078	BME-2012-030	BME-2012-039
17:00-17:15	BME-2012-097			BME-2012-110
17:15-18:00	Free time			
18:00-20:00	Welcome Party (Sunee Grand Hotel)			

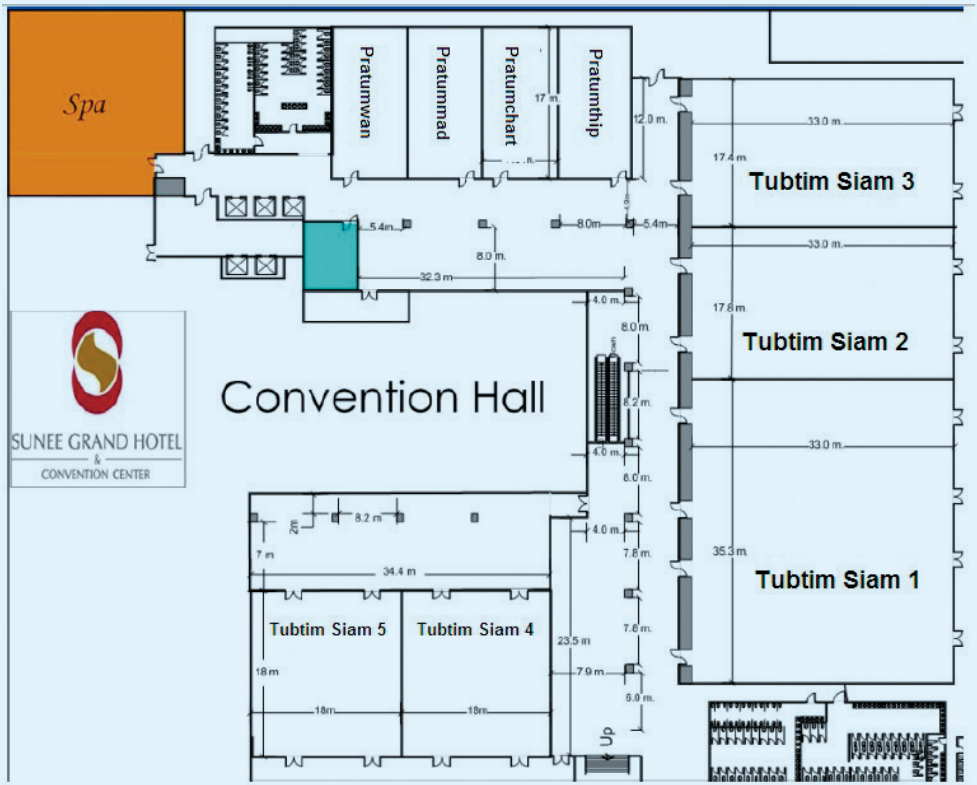
Thursday, December 6, 2012 (Day-2)

08:00-09:00	Registration			
09:00-09:30	Keynote speaker : Dr. Yu wei Shin			
09:30-10:00	Keynote speaker : Prof. Dr.Pradit Terdtoon			
10:00-10:30	Coffee Break			
Session	Room Tubtim Siam II	Room Phatumwan	Room Phatummad	Room Phatumchart
Session Topic	D2R1ML-Signal II	D2R2ML-Simulation II	D2R3ML-Physiological Modeling	D2R4ML-Mis II
Chair	Booncharoen Wongkittisuksa	Supan Tuungitkusolmun	Timothy Gale	Kazuhiko Hamamoto
10:30-10:45	BME-2012-085	BME-2012-114	BME-2012-011	BME-2012-029
10:45-11:00	BME-2012-015	BME-2012-074	BME-2012-062	BME-2012-045
11:00-11:15	BME-2012-058	BME-2012-080	BME-2012-068	BME-2012-056
11:15-11:30	BME-2012-079	BME-2012-090	BME-2012-024	BME-2012-072
11:30-11:45	BME-2012-096	BME-2012-099	BME-2012-052	BME-2012-069
11:45-12:00	BME-2012-067	BME-2012-012	BME-2012-064	BME-2012-125
12:00-13:00	Lunch			
13:00-16:00	Travel to Pekse, Laos			
16:00-18:00	Check-in at Arawan Riverside Hotel, Laos			
18:00-21:00	Conference Banquet (Arawan Riverside)			

Friday, December 7, 2012 (Day-3)

6:00-8:00	Breakfast at Arawan Riverside Hotel
8:00-12:00	Research networking event
12:00-13:00	Lunch
13:00-15:00	Research networking event
15:00-16:00	Get back to Ubon Ratchathani, Thailand

End of Conference, Have a good weekend Thailand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Convention Hall
SUNEE GRAND HOTEL
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CONVENTION CENTER
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Tubtim Siam 4
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33.0 m.
17.4 m.
5.4m.
8.0m.
32.3 m.
4.0 m.
8.0 m.
17.8 m.
8.2 m.
33.0 m.
8.2 m.
7 m.
34.4 m.
35.3 m.
23.5 m.
7.9 m.
18 m.
18m.