BMEiCON 2014

The 7th Biomedical Engineering International Conference

November 26-28, 2014

Fukuoka, Japan

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Welcome Address by General Chair

On behalf of the Organizing Committee, it is my great honor to invite you to the 7th Biomedical Engineering International Conference (BMEiCON 2014), which will be held in Fukuoka from November 26th to 28th, 2014. The 5th BMEiCON was held in Kyoto, Japan in 2010. This is the second BMEiCON which is held in Japan.

BMEiCON has become a worldwide International conference in these 4 years. There were more than 200 participants from more than 15 countries in last conference. I hope this conference will be a key conference in the field of biomedical engineering in Asia and Pacific countries.

The BMEiCON 2014 provides an established forum for scientists, engineers, researchers and professionals on the field of biomedical engineering to exchange ideas, latest research results and information in these areas through presentation and discussion.

In this conference, we make new contrivances for enlivening the conference. It is a setting of a poster session without the 4-page proceedings. We think that it becomes easily to join the conference, especially for young researchers and students. Besides, some students from Thailand are invited to this conference by support of JST (Japan Science and Technology Agency) and Graduate School of Systems Life Sciences, Kyushu University. This activity is a part of SAKURA Exchange Program in Science by JST.

In this conference, according to these contrivances, many students and young researcher are expected to join the conference. I hope these young powers could activate the conference. I also hope each participant makes relationship and fosters an international collaboration in Biomedical Engineering field.

Since Fukuoka is not leisure venue and any specific entertainments such as traditional dance or KRAOKE are not prepared, please enjoy purely scientific discussion in the meeting.

I would like to say many thanks to all committee members and other staff for their supports.

I hope that all participants enjoy the meeting and find it a rewarding experience.

Prof. Keiji IRAMINA
General Chair
Graduate School of Systems Life Sciences,
Kyushu University, Fukuoka, Japan

Welcome from the Technical Program Chair

On behalf of the Technical Program Committee, I would like to welcome you to the 2014 Biomedical Engineering international conference –BMEiCON2014- to be held in Fukuoka, Japan during November 26-28, 2014.

This year we received a number of 112 paper submissions, out of which 93 papers have been accepted. The final technical program is the result of a strictly blinded review process, with each paper received at least two reviews from the respective research community. The papers for the technical program will all be orally presented with lecture style in 18 technical sessions. All accepted papers for oral presentations will be submitted to be appeared in IEEE explore. BMEiCON 2014 is also the first BMEiCON that covered the poster sessions where 37 papers have been accepted.

I would like to express my sincere appreciation and thanks to all technical program committee members and the external reviewers for their great efforts in the paper review process. I would like to thank all the authors who submitted their papers to BMEiCON 2014. I look forward to seeing you all in Fukuoka, Japan in December in the middle of spectacular autumn seasons.

Chuchart Pintavirooj
Technical Program Chairs

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Somkiat Wattanasirichaigoon, Srinakharinwirot University

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30 Wongwit Senavongse, SWU, Thailand
31. Yagi Tohru, Tokyo Institute of Technology, Japan
32. Keiji IRAMINA, Kyushu University, Japan

Keynote Speaker 1

Professor Somkiat Wattanasirichaigoon, MD, FRCST.
Director, Health Systems Research Institute,
Ministry of Public Health, Thailand

Graduating with an MD in 1983, Professor Somkiat Wattanasirichaigoon joined the surgical residency program at Khon Kaen University's Faculty of Medicine. It was during his surgical training that his paper, entitled "How a Retained Surgical Sponge Migrates into the Intestinal Lumen," won the University's Resident Research Award, which in turn led to his appointment as a lecturer at Srinakharinwirot University's Faculty of Medicine. He became an associate professor a few years later.

Owing to his extensive research portfolio, he was promoted to Professorship in Surgery in 2001 at Srinakharinwirot University. During his tenure from 2007-2010 as Dean of Srinakharinwirot University's Faculty of Medicine, he pioneered a pay-for-performance concept in the public sector and initiated the individual key performance indicators and an international medical curriculum.

In addition to being President of the Thai Biomedical Engineering Association and secretary to the National Research Council of Thailand's Executive Committee, Dr. Wattanasirichaigoon was recently appointed Director of the Health Systems Research Institute (HSRI). He is HSRI's fifth director since its inception in 1992.

Keynote Speaker 2

Prof. Dr. Jan Lauwereyns

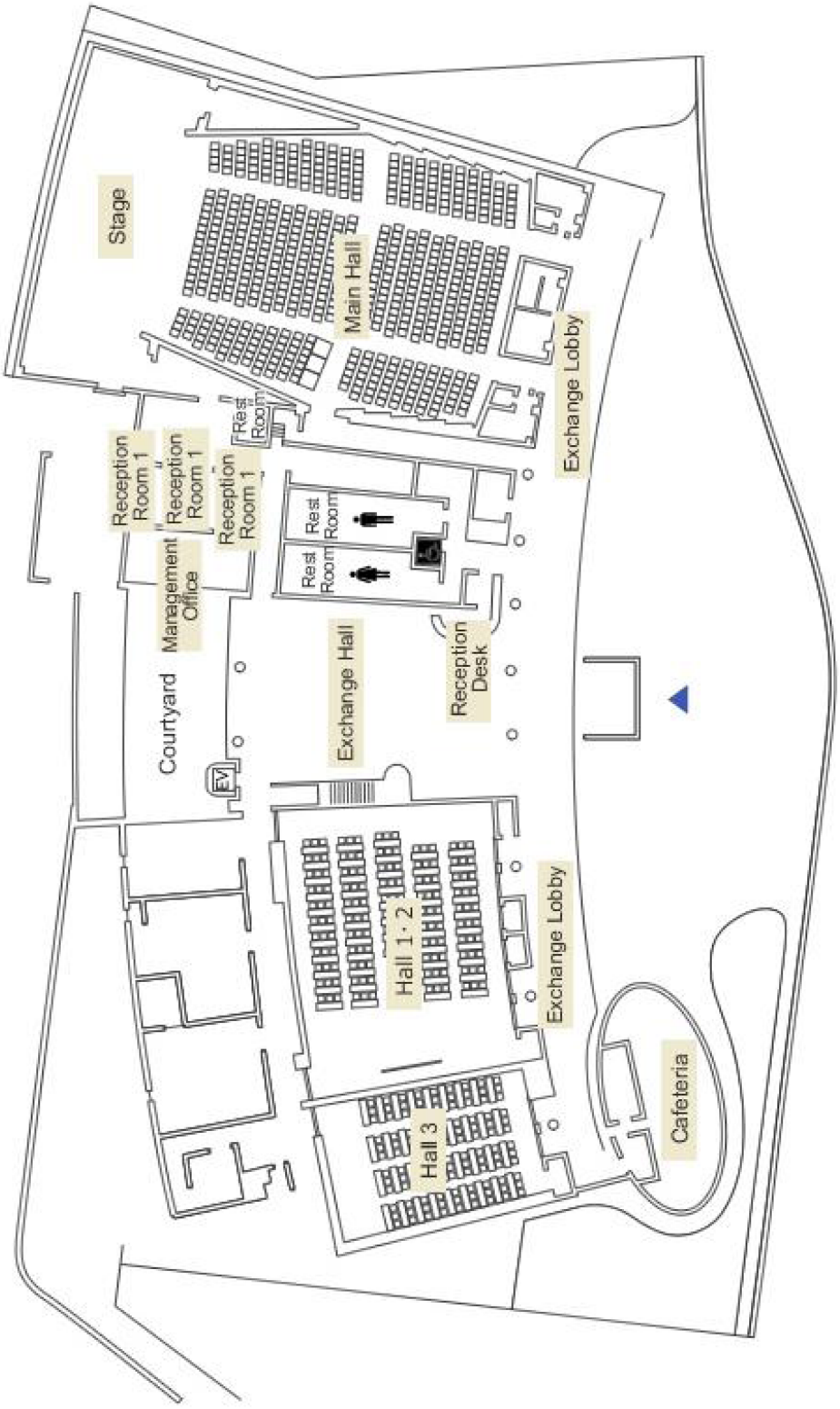
Prof. Dr. Jan Lauwereyns is a cognitive neuroscientist with expertise on the topic of decision-making and visual perception. He obtained his Ph.D. from the University of Leuven (Belgium) in 1998. Since then he has lectured and conducted research at several top institutes, including the National Institutes of Health (U.S.A.), Juntendo University (Japan), and Victoria University of Wellington (New Zealand). In 2010 he moved to Kyushu University, where he is now a Professor in the Faculty of Arts and Science and in the Graduate School of Systems Life Sciences. He has published numerous journal articles as well as two single-author monographs with The MIT Press: The Anatomy of Bias and Brain and the Gaze. His work targets an interdisciplinary approach, including psychology, neuroscience, philosophy, and mathematics.

Keynote Speaker 3

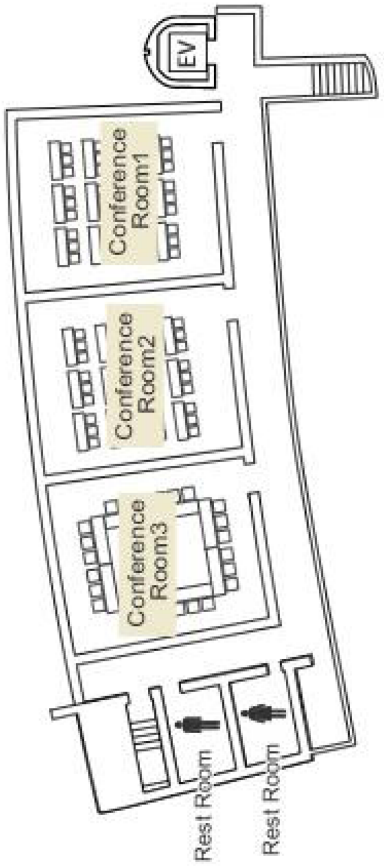
Assoc. Prof. Seiichi Suzuki

Assoc. Prof. Seiichi Suzuki, has been conducted research in the field of bio-medical engineering and human interface. He received the Doctor of Medicine from Graduate School of Medicine, The University of Tokyo in March 1991. Since April 1991, he was assistant in Department of Electrical Engineering and Electronics, Department of Technology, Seikei University. Since 1998 he has been associate professor in Department of Materials and Life Science, Seikei University.

BMEiCON2014 Draft Schedule						
Day 1 : Wednesday, November 26, 2014						
9:30 - 10:30	Registration, *Exchange Hall, Centennial Hall*					
10:30 - 11:00	Opening Ceremony, **Prof.Dr.Keiji Iramina**, *Main Hall, Centennial Hall*					
11:00 - 11:30	Keynote Speaker I : **Assoc. Prof. Dr.Seiichi Suzuki**, MD, *Main Hall, Centennial Hall*					
11:30 - 12:00	Keynote Speaker II : , *Main Hall, Centennial Hall*					
12:00 - 13:00	Lunch (Japanese Lunch Box), *Main Hall, Centennial Hall*					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D1R1AE-Medical Image Processing I		D1R2AE-Medical Signal Processing I		D1R3AE-Biosensor	
Session Chair	Caillin E. Sutherland		Suparerk Janjarasjitt		Suzuki Seiichi	
13:00 - 13:15	*1570016021*	*Caillin E. Sutherland*	*1570011951*	*Suparerk Janjarasjitt*	*1570017767*	*Suzuki Seiichi*
13:15 - 13:30	*1569986445*	*Zhicheng Li*	*1570022473*	*L. Tiawongsuwan*	*1570009209*	*Chanchai Thaijiam*
13:30 - 13:45	*1570006615*	*Tian Swee Tan*	*1570022585*	*Ryoko Nomura*	*1570016245*	*Jia Wen Li*
13:45 - 14:00	*1570015591*	*W. Tangsuksant*	*1570022657*	*Pariyakorn Boonperm*	*1570022229*	*Nurul F. Ab. Halim*
14:00 - 14:15	*1570024027*	*Jathurong Sugruk*	*1570022513*	*Wimol San-Um*	*1570022509*	*Piyawat Pitikultham*
14:15 - 14:30					*1570023843*	*Manop Sansuk*
14:30 - 14:45	Coffee Break					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D1R1AL-Rehabilitation Engineering I		D1R2AL-Medical Signal Processing II		D1R3AL-Biomechanics&Biomaterial	
Session Chair	Warakorn Chareornsuk		Supan Tungjitkusolmun		Phornphop Naiyanetr	
14:45 - 15:00	*1570001903*	*Hieyong Jeong*	*1570022445*	*Varadach Amatanon*	*1570020467*	*Sani Boonyagul*
15:00 - 15:15	*1570011445*	*T. Wilaiprasitporn*	*1570022465*	*K. Tharawadeepimuk*	*1570022043*	*Saki Shimizu*
15:15 - 15:30	*1570022477*	*P. Triponyuwasin*	*1570022543*	*Tick Sengthipphany*	*1570022049*	*Soichiro Watanabe*
15:30 - 15:45	*1570022601*	*P. Pongpanitanont*	*1570022627*	*C. Phamornnak*	*1570022597*	*Udomporn Manupibul*
15:45 - 16:00	*1570022961*	*Pradkij Panavaranan*	*1570021965*	*Weichen Liu*	*1570022621*	*Jutamanee Poonsiri*
16:00 - 16:15	*1570022965*	*W. Phornsiricharoenph*			*1570022629*	*Pitchaya Rayothee*
16:15 - 17:00	Free time for preparing Welcome Party					
17:00 - 18:00	Welcome Party, *Hall I, Centennial Hall*					
Day 2 : Thursday, November 27, 2014						
8:30 - 9:00	Registration, *Exchange Hall, Centennial Hall*					
9:00 - 9:30	Keynote Speaker III : **Prof.Dr.Jan Lauwereyns**, *Hall I, Centennial Hall*					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D2R1ME-Medical Image Processing II		D2R2ME-Healthcare Information System		D2R3ME-Biomedical Instrumentation I	
Session Chair	Wibool Piyawattanametha		Adisorn Leelasantitham		Arthorn Sanpanich	
9:30 - 9:45	*1570022249*	*W. Piyawattanametha*	*1570011259*	*Lichin Chen*	*1570021833*	*Arthorn Sanpanich*
9:45 - 10:00	*1570021881*	*C. Phromsuthirak*	*1570019309*	*N. Singkhleewon*	*1570022651*	*C. Rungsirikunnan*
10:00 - 10:15	*1570021911*	*Somsri Daochai*	*1570019901*	*Bo-Chiang Huang*	*1570023709*	*K. Kujaroentavon*
10:15 - 10:30	*1570022569*	*C. Panyindee*	*1570022305*	*K. Lerdwuttiaugoon*	*1570024121*	*Khanittha Kaewdang*
10:30 - 10:45	*1570022531*	*Samart Tuamputsha*	*1570022587*	*Parinya Otarawanna*		
10:45 - 11:00	Coffee Break					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D2R1ML-Rehabilitation Engineering II		D2R2ML-Tissue Engineering& Cardio Vascular		D2R3ML-Biomedical Instrumetation II	
Session Chair	Yodchanan Wongsawat		Jan Lauwereyns		Sumet Umchid	
11:00 -11:15	*1570022459*	*Dollaporn Anopas*	*1570022315*	*Ravi Laohasurayodhin*	*1570022151*	*Sumet Umchid*
11:15 - 11:30	*1570022485*	*Trisak Yamsa-ard*	*1570022721*	*R. Deepankaew*	*1570017943*	*N. Thongpance*
11:30 - 11:45	*1570022607*	*T. Prasertsakul*	*1570023739*	*Jittrawan Thaiprasit*	*1570022481*	*N. Jirakittayakorn*
11:45 - 12:00	*1570022963*	*Wachara Sroykham*	*1570024059*	*A. Pamsubsakul*	*1570022505*	*P. Phasukkit*
12:00 - 12:15	*1570001907*	*Hieyong Jeong*	*1570023893*	*K. Viravaidya-Pasuwat*	*1570022523*	*N. Laowattanatham*
12:15 - 13:00	Lunch Break (Japanese Lunch Box), Centennial Hall					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D2R1AE-Medical Image Processing III		D2R2AE-Medical Signal Processing III		D2R3AE-Biomedical Instrumetation III	
Session Chair	T. Charoenpong		Surapong Pongyupinpanich		Soochan Kim	
13:00 - 13:15	*1570021251*	*T. Charoenpong*	*1570020681*	*S. Pongyupinpanich*	*BMEiCON-0004*	*Soochan Kim*
13:15 - 13:30	*1570022309*	*Somchat Taertulakarn*	*1570016239*	*Meng Wang*	*BMEiCON-0001*	*K. Kaewkannate*
13:30 - 13:45	*1570022635*	*Suchin Adhan*	*1570022177*	*Thanida Siritan*	*BMEiCON-0003*	*Yuttana Pititeeraphap*
13:45 - 14:00	*1570022677*	*Ameya Patil*	*1570022253*	*Tian Swee Tan*		
14:00 - 14:15	*1570022483*	*Wimol San-Um*	*1570023351*	*Tasawan Puttasakul*		
14:15 - 14:30	Coffee Break					
Session Room	Hall I		Conference Room I		Conference Room II	
Session Topic	D2R1AL-Medical Image Processing IV		D2R2AL-Other BME Related Fileds		D2R3AL-Biomedical Instrumetation IV	
Session Chair	Kazuhiko Hamamoto		Tohru Yaki		Kenji Yamada	
14:30 - 14:45	*1570022535*	*B. Sukanan*	*1570006635*	*Tian Swee Tan*	*1570022161*	*A. Wongkamhang*
14:45 - 15:00	*1570022557*	*Sorawit Fong-in*	*1570014749*	*Yan-Bo Lin*	*1570022565*	*B. Banik Pathik*
15:00 - 15:15	*1570022567*	*V. Pawankiattikun*	*1570023725*	*K. Sampuangthong*	*1570022969*	*Yunyong Punsawad*
15:15 - 15:30	*1570024333*	*Dilok Puanhvuan*	*BMEiCON-0002*	*T. Angsuwatanakul*	*1570022489*	*Hussein Alnassan*
15:30 - 15:45						
15:45 - 17:45	**Poster Session**, *Exchange Hall* : 40 Posters					
17:40 - 18:00	BMEiCON 2015 Presentation, *Hall I, Centennial Hall*					
18:00	Travel to Banquet Venue					
18:30 - 20:30	Conference Banquet					
Day 3 : Friday, November 28, 2014 (Only for attendees who interested to join academic tour)						
8:30 - 9:00	Registration, *Exchange Hall, Centennial Hall*					
Session Room	Hall I					
9:00 – 12:00	Tutorial lecture and Workshop for student and attendee at Hospital Campus					
12:00	End of Conference, Have a good weekend in Fukuoka, Japan					



1F Floor Plan



2F Floor Plan

Programs & Abstracts

Technical Program

Wednesday, November 26, 2014 (Day-1)	
Room	Hall1
Session	D1R1AE-Medical Image Processing I
Chair	Caillin E. Sutherland
13:00 - 13:15	1570016021 Caillin E. Sutherland
13:15 - 13.30	1569986445 Zhicheng Li
13.30 - 13.45	1570006615 Tian Swee Tan
13:45 - 14:00	1570015591 W. Tangsuksant
14:00 - 14.15	1570024027 Jathurong Sugruk

Session: D1R1AE-Medical Image Processing I

1570016021: Non-Contact Resratory Monitoring in Neonaes

Caillin Eastwood-Sutherland

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Timothy J. Gale

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Keywords: -

Abstract:

Breathing difficulties are common in neonatal patients, and non-contact respiratory monitoring is an area of research which may potentially benefit patients and medical professionals alike by reducing disturbance of the patients by the monitoring system. This paper discusses a range of approaches used in recent years including magnetic, radio, optoelectronic and structured light. We also outline our research into using an optical time-of-flight system based on a game controller (Microsoft KinectTM v2) to measure respiratory parameters.

Session: D1R1AE-Medical Image Processing I
1569986445: Augmented Reality Using 3D Shape Model for Ultrasound-Guided Percutaneous Renal Access A Pig Model Study

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Keywords: -

Abstract:

Successful percutaneous nephrolithotomy (PCNL) highly depends on an accurate needle access into the kidney. This step is challenging and must be performed under intraoperative image guidance. This paper presents a 3D augmented reality method for ultrasound (US)-guided percutaneous renal access in PCNL. First, a 3D statistical kidney model is built aforehand from aligned training shapes. Intraoperatively, a patient-specific kidney model is recon structed from sparse US slices using the statistical model. The US images are then augmented with the reconstructed kidney model and a real-time tracked needle. Under the augmented-US guidance, percutaneous renal puncture can be performed. Experiments results based on pig model have validated the presented ultrasound guidance method.

Session: D1R1AE-Medical Image Processing I
1570006615: MAGNETIC RESONANCE IMAGE SEGMENTATION FOR KNEE OSTEOARTHRITIS USING ACTIVE SHAPE MODELS

Sarah Samson Soh
IJN-UTM Cardiovascular Engineering Centre, Medical Implant Technology Group (MediTEG), Material. Manufacturing Research Alliance (MMRA), Department of Biotechnology & Medical Engineering, Faculty of Biosciences and Medical Engineering (FBME), Universiti Teknologi Malaysia (UTM), 81310 Skudai Johor, Malaysia"

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Leong Kah Meng

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Keywords:

Active Shape Models, Knee Articular Cartilage, MRI, Principal Component Analysis, Segmentation;

Abstract:

Knee osteoarthritis is a chronic joint inflammation disease that affects the aged population nowadays. The disease leads to gradual degradation of cartilage and thus deteriorates the function of the knee joint. Magnetic Resonance Imaging (MRI) provides promising results for the early detection of knee osteoarthritis. Conventionally, the MR image segmentation for knee osteoarthritis is manually done by clinicians. Limitations of this process include being laborious, time-consuming and prone to subjective diagnosis error. Therefore, the development of an automated cartilage segmentation method is crucial to assist the medical research in knee osteoarthritis. This project applied the Active Shape Models (ASM) approach to create semi-automated cartilage segmentation software. A shape model was constructed from training set consisting of 10 knee MR images which includes major variations of the knee cartilage shape. Principle component analysis (PCA) was utilized to identify the main axes of variations used to build the shape model. This shape model was finally used to segment the knee articular cartilage. Outcomes of the ASM segmentation were compared with the outcome of manual segmentation. Experimental results showed that the sensitivity of developed ASM approach increased averagely from 73.78% to 80.75%, proportional to the increasing of the number of iteration in the segmentation as well as landmark of the shape model. This technique is reliable to contribute to medical research in knee osteoarthritis by providing an efficient and high accuracy segmentation method for knee articular cartilage, to further assist in the detection of knee osteoarthritis via MRI technique.

Session: D1R1AE-Medical Image Processing I

1570015591: American Sign Language Recognition by Using 3D Geometric Invariant Feature and ANN Classification

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Keywords:

American Sign Language recognition, Geometric invariant feature, 3D extraction, ANN;

Abstract:

Communication between normal and disabled person has been developed in several researches. The hand gesture is one of important communication for the deaf, especially American Sign Language (ASL) is used in order to represent each alphabet (A-Z). This paper aims to translate ASL from static postures. Besides, this research also designs the glove with six different colored markers and develop algorithm for alphabet classification. Moreover the system is set by two cameras in order to extract 3D coordinate points from each marker. There are three main important processes for algorithm consists of marker detection by using Circle Hough Transform, computation all feasible triangle area patches constructed from 3D coordinate triplet that is novel feature, and process of classification by using feedforward backpropagation of Artificial Neural Network. The experimental result shows average of accuracy is 95 percent that is high performance and feasibility for proposed method.

Session: D1R1AE-Medical Image Processing I

1570024027: Automated Classification between Age-related Macular Degeneration and Diabetic Macular Edema

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Keywords:
optical coherence tomography; OCT; age-related macular degeneration; AMD; diabetic macular edema; DME; image segmentation; classification;

Abstract:
Age-related macular degeneration (AMD) and Diabetic macular edema (DME) are to lead causes to make a visual loss in people. People are suffered from the use of many time to diagnose and to wait for treatment both of diseases. This paper proposes a step of image segmentation to be divided the optical coherence tomography (OCT) to find the retinal pigment epithelium (RPE) layer and to detect a shape of drusen in RPE layer. Then, the RPE layer is used for finding retinal nerve fiber layer (RNFL) and for detecting a bubble of blood area in RNFL complex. Finally, this method uses a binary classification to classify two diseases characteristic between AMD and DME. We use 16 OCT images of a case study to segmentation and classify two diseases. In the experimental results, 10 images of AMD and 6 images of DME can be detected and classified to accuracy of 87.5%.

Technical Program

Wednesday, November 26, 2014 (Day-1)	
Room	Conference Room I
Session	D1R2AE-Medical Signal Processing I
Chair	Suparerk Janjarasjitt
13:00 - 13:15	1570011951 Suparerk Janjarasjitt
13:15 - 13:30	1570022473 L. Tiawongsuwan
13:30 - 13:45	1570022585 Ryoko Nomura
13:45 - 14:00	1570022657 Pariyakorn Boonperm
14:00 - 14:15	1570022513 Wimol San-Um

Session: D1R2AE-Medical Signal Processing I

1570011951: Reexamination of Characteristic of Spectral Exponent of Epileptic EEGs Corresponding to Levels in Wavelet-Based Fractal Analysis

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Keywords:

electroencephalogram, seizure, epilepsy, wavelet transform, spectral exponent;

Abstract:

Recently, the characteristics of epileptic EEG data have been examined by using the wavelet-based fractal analysis. It was observed that epileptic EEG data may be associated with multiple spectral exponents. In this study, the characteristic of spectral exponents of epileptic EEG data determined from various intervals of levels (or ranges of spectral subbands) is reexamined by applying the wavelet-based fractal analysis to EEG data of epilepsy patients. From the computational results, it is confirmed that the spectral exponent of epileptic EEG data varies corresponding to an interval of levels from which it is determined. Also, it is shown that the spectral exponents of epileptic EEG data obtained during non-seizure period and seizure activity determined from high frequency (10.85–21.70Hz) subband and low frequency (1.36–10.85Hz and 2.71–21.70Hz) subbands are substantially different

Session: D1R2AE-Medical Signal Processing I

1570022473: QEEG Analysis During Bicycle Riding For Parkinson's Patient

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Keywords:

QEEG; EEG; BCI; Parkinson; Bicycle;

Abstract:

Parkinson's disease is one of movement disorder that affected to quality of life. The exercise training can improve movement of patients. The aim of this study was to investigate the effect of bicycle riding to the brain activity by observing the absolute power and coherence revealed by the quantitative electroencephalogram (QEEG). The participants consisted of four healthy individuals. Each participant rode a stationary bicycle. The QEEGs of before biking, during biking and after biking were observed. The result showed that the brain activity of during biking will increase both absolute power and coherence when compared with before biking and after biking. Therefore, we suggest that cycling could maintain high coherence across the motor area which is potentially being a good exercise for Parkinson's patient.

Session: D1R2AE-Medical Signal Processing I

1570022585: Biometrics Authentication Based on Chaotic Heartbeat waveform

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Keywords:

Authentication, Biometrics,Heartbeat waveform,Chaos;

Abstract:

In this paper, we propose a personal authentication method using heartbeat waveforms to enhance the security in wireless communication. In the heartbeat waveforms of a human being, it is known that there are discriminative characteristic features and the mimicking is very difficult. Therefore, their application to personal authentication has been studied. Existing method performs personal authentication using a chaos indicator of ECG. In this paper, we propose an authentication method that extends the index in order to increase the accuacy of authentication. To validate that our personal authentication method is applicable, we perform some experiments to show that our method provides better authentication than existing one.

Session: D1R2AE-Medical Signal Processing I
1570022657: ECG Analyzing program for Arrhythmia detection

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Keywords:
Electrocardiogram, Arrhythmia, MATLAB;

Abstract:
The ECG analysis program can provide much information about cardiac disorder. Comparison with visual analysis, require specialist which are not available in many occasion. Therefore, computer-based technique that develops for ECG analysis can used to training inexperience staff and prediagnostic the ECG data. In this work, the ECG analyzing algorithm for arrhythmia detection was applied using MATLAB. Parameters that used in this analysis were peak of P wave, QRS Complex and T wave. The detection of the RR interval, PR interval, QRS complex, QT interval and conversion of the RR interval to heart rate (beat per minute) were developed. ECG analyzing program is easy to use by simply load the ECG data to analyze both the necessary value for arrhythmia detection and type of arrhythmia. In conclusion, the ECG analysis program using as a pre-screen test for ruler area and also use as a training system for medical staff was developed.

Session: D1R2AE-Medical Signal Processing I

1570022513 : The Quantitative Analysis of Nonlinear Behaviors of Arrhythmia through Lyapunov Exponents

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Keywords:
Quantitative Analysis, Nonlinear Behaviors,Arrhythmia, Lyapunov Exponent;

Abstract:
This paper presents the quantitative analysis of nonlinear behaviors arrhythmia through Lyapunov Exponents (LEs). Generally, arrhythmia exhibits relatively random electro cardiogram and hence a nonlinear chaotic series. Such behaviors can be distinguished from normal electrocardiogram in terms of nonlinear dynamics analysis, including phase-space analysis. However, Lyapunov Exponents that quantitatively characterizes chaos that appears in arrhythmia may provide better clear perspective for diagnosis. In this paper, ten series of normal electrocardiograms are compared with other 10 series of arrhythmia. The results reveal that those most series that have arrhythmia have higher values of LEs. The results suggest that the utilization of LEs for arrhythmia analysis may be one of potential alternative in heart decease diagnosis.

Technical Program

Wednesday, November 26, 2014 (Day-1)

Room	Conference Room II
Session	D1R3AE-Biosensor
Chair	Suzuki Seiichi
13:00 - 13:15	1570017767 Suzuki Seiichi
13:15 - 13:30	1570009209 Chanchai Thaijiam
13:30 - 13:45	1570016245 Jia Wen Li
13:45 - 14:00	1570022229 Nurul F. Ab. Halim
14:00 - 14:15	1570022509 Piyawat Pitikultham
14:15 - 14:30	1570023843 Manop Sansuk

Session: D1R3AE-Biosensor
1570017767: High Sensitivity Antigen Detection by Fluorescence Anisotropy Decay Immunosensor

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Keywords:
Immunosensor; fluorescence anisotropy decay; Nonspecific adsorption; High sensitivity;

Abstract:
Immunosensor is an ideal kind of biosensor, which enables highly specific detection of any kind of biological molecules. However, in spite of long and intensive efforts of research and development, no immunosensor is in practical use. This is mainly because of the difficulty in reduction of the back ground noise of non-specific adsorption. In this study, fluorescence anisotropy decay principle was employed to avoide the disturbance of non-specific adsorption. Fluorescent labeled antibody, with Pyrene derivative, was immobilized on the surface of quartz substrate. Fluorescence anisotropy of immobilized antibody was measured by evanescent excitation stage. Antigen solution was administrated on the surface of the substrate and antigen antibody binding was detected as fluorescence anisotropy change. Detection of antigen at the concentration of as low as 100 fg/mL was demonstrated

Session: D1R3AE-Biosensor
1570009209: In a Part of Design and Construction Using PressureVolume Conductance Catheterisation techniques for Cardiology Diagnostic Tests

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Keywords:
Terms—conductance catheterisation, piezoresistive silicon micromachined sensor, cardiac function estimation, pressure-volume catheter;

Abstract:
Pressure-volume catheterisation techniques can be employed to investigate cardiology work-flow during the cardiac cycle in continuous real time. However, cost of a pressure-volume catheter is quite expensive when compared to medical fee for animal care in Thailand. This paper presents how to design and construct a pressure-volume catheter using a microelectronic pressure sensor and conductance techniques. Results show how possible to design and construct the pressure-volume (PV) catheter to estimate cardiac function.

Session: D1R3AE-Biosensor
1570016245: Investigation on Error Performance for Galvanic-type Intra-body Communication with Experiment

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Keywords:
Intra-body Communication; Error Performance; Bit Error Rate; Eye-diagram; Jitter;

Abstract:
Intra-body Communication (IBC), which utilizes the human body act as communication channel, offers a novel technology for information exchange in Biomedical Engineering (BME) field. Galvanic-type IBC has been a promising choice for IBC because of its advantages like lesser interference to the nearby environment and lower frequency operation. Bit Error Rate (BER) is a standard figure of merit to indicate the error performance of communication channel. For low frequency and low transmit rate in galvanic-type IBC, the traditional method of BER measurement is time-consuming. Furthermore, to measure through the human body for such a long time is neither practical nor feasible without physiological changes. In order to evaluate the error performance of galvanic-type IBC, this paper presents an alternate approach to investigate BER values of the channel and verifies its behaviors with human lower arm experiment. After comparing the experimental results and theoretical calculation based on ideal Additive White Gaussian Noise (AWGN) channel, it is found that their traces have similar agreement. Besides, the experimental phenomenon indicates the assumptions that channel noise of galvanic-type IBC has AWGN characteristic are reasonable and applicable in some regions.

Session: D1R3AE-Biosensor

1570022229: Amino acids sensor based on graphene sheet/congo red-molecular imprinted polymer organic-thin-film transistor for biomedical application.

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Keywords:

Graphene, organic thin film transistor, and Molecular imprinted Polymer;

Abstract:

Molecular imprinted polymer (MIP) is a technique to produce a template-shape cavities in polymer matrix with memory of the template/target molecule for chemical sensor front-end development. In this study, it has been shown that the incorporation of graphene sheet congo-red (GSCR) has enhanced the performance of Organic Thin Film Transistor (OTFT) amino acid (serine) chemical sensor. The sensor has a lower detection limit of 70 ppm serine concentration with a good repeatability and reproducibility. The GSCR-MIP sensor has a good potential for other application such as detecting amino acid biomarkers for early detection of cancer disease in blood.

Session: D1R3AE-Biosensor

1570022509: Amperometric Acetylcholine Biosensor Based on Graphene-PEDOT:PSS Modified Electrode

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Keywords:
biosensor; acetylcholine; graphene-PEDOT/PSS; enzyme immobilization;

Abstract:
A promising acetylcholine biosensor based on graphene-PEDOT:PSS (GR-PEDOT:PSS) and bienzyme, choline oxidase (ChOx) and acetylcholine esterase (AChE), modified electrode was successfully fabricated. GR-PEDOT:PSS ink was directly dropped on the screen printed carbon electrode (SPE), and then ChOx and AChE in the optimized loading ratio were immobilized on GR-PEDOT:PSS/SPE by the 10% glutar-aldehyde (GA) vapor cross-linked for 8 minutes. 1% Nafion was coated on the outermost layer of AChE-ChOx/GR-PEDOT:PSS/SPE for performing as a protective film. For amperometric responding, our acetylcholine biosensor showed a low limit detection, high linearity and sensitivity, which were 50 µM, 50 to 250 µM and 486.1 nA/mM, respectively, at -200 mV versus Ag/AgCl reference electrode. Moreover, this biosensor has a simple preparation, low-cost fabrication, and stable detection, thus it is a novel tool for acetylcholine determination.

Session: D1R3AE-Biosensor

1570023843: Amperometric Detection of Organophosphate and Carbamate Pesticides Based on AuNPs/GraphenePEDOT:PSS Nanocomposites Modified Electrode

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Keywords:
Graphene-gold nanocomposite; Organophosphate pesticide; Carbamate pesticide; Screen printed carbon electrode; Biosensors;

Abstract:
The disposable electrochemical biosensor based on enzyme inhibition were constructed for detection of organophosphate and carbamate pesticides. The nanocomposite film of gold nanoparticles and graphene/PEDOT-PSS were prepared on the surface of screen-printed carbon based electrodes (SPCEs). Acetylcholinesterase enzyme was immobilized onto the film via cross-linking method. The composite film provides specific surface area and high conductivity. A significant synergistic effect of nanocomposites on the biosensor performance was observed in sensing of acetylthiocholine chloride and the inhibition of paraoxon and carbofuran. Graphene/PEDOT-PSS/AuNPs enhanced electron transfer reaction at a lower potential and catalyzed the electrooxidation of thiocholine. Based on the inhibition of paraoxon on the AChE activity, a linear range of 10-400 ppb were obtained. For carbofuran determination, two linear ranges at 0.5-10 and 200-500 ppb can be found. The developed biosensor exhibited good sensitivity and providing a good promising tool for pesticides analysis.

Technical Program

Wednesday, November 26, 2014 (Day-1)

Room	Hall I
Session	D1R1AL-Rehabilitation Engineering I
Chair	Warakorn Chareornsuk
14:45 - 15:00	1570001903 Hieyong Jeong
15:00 - 15:15	1570011445 T. Wilaiprasitporn
15:15 - 15:30	1570022477 P. Triponyuwasin
15:30 - 15:45	1570022601 P. Pongpanitanont
15.45 - 16.00	1570022961 Pradkij Panavaranan
16.00 - 16.15	1570022965 W. Phornsiricharoenph

Session: D1R1AL-Rehabilitation Engineering I
1570001903: Forward Kinematic Solution through Geometry Analysis for Rehabiltation Cable Robot

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Keywords:
Geometry analysis, Forward kinematic solution, Cable-driven paralel end efector, Rehabiltation Intersection point;

Abstract:
We have an interest in the forward kinematic solution of a three-DOF cable-driven paralel end effecter for rehabiltation of the uper limbs. Although to solve the forward kinematic solution is to decide the position and orientation of end efecter by using four given cable lengths, it is well known that it is dificult to make sure the only solution among multiple solutions of cable-driven paralel end effecter because of the lack of given information. Through the eometry analysis, we newly found that the orientation of end effecter can be estimated from intersection points of four circles drawn by four given cables. Acordingly, we prove that the position and orientation for the only solution can be easily decided by our new proposal method without the extra sensory system and the calculation of complicated non-linear equation.

Session: D1R1AL-Rehabilitation Engineering I

1570011445: New Visual Stimulation Paradigm for P300-Based Brain-Computer Interfaces

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Keywords: -

Abstract:
We developed a new visual stimulation paradigm for P300-based brain-computer interfaces. The principal idea is to enhance P300 amplitude by modulation of spatial attention to a flickering visual target. A small flicker matrix was used for evaluation. Six healthy volunteers participated in experiments, and brain signals were recorded by electroencephalography. We used three basic measures referred to as on-peak, off-peak and peak to compare P300 responses among the participants. We found that compared with existing methods, the proposed stimulation paradigm gave better results in terms of P300 amplitude. The results of this study are expected to contribute to various brain-computer interface applications.

Session: D1R1AL-Rehabilitation Engineering I

1570022477: Brain-Computer Interface Based Stroke Rehabilitation For Hemiplegia

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Keywords:
Stroke Rehabilitation; Brain-Computer Interface; Event-Related Desynchronization; Hemiplegia;

Abstract:
Stroke is widely common cause of death and disability in adult. It is occurred when the blood supply in the brain is ruptured or blocked. Post stroke rehabilitation is the most important for stroke survivors because it assists them to restore their physical function such as arm movement, walking and daily life activity. Neuro-rehabilitation can enhance neuron pathways and improve motor function of patients. The neuron system can be restored their function and it is called neuroplasticity. The purpose of this paper is to develop stroke rehabilitation for hemiplegia based on Brain-computer interface (BCI). ERD/ERS which occur during motor imagery and motor execution of arm or leg are used as the control in this system. Most of BCI based stroke rehabilitation classified between right and left arm but stroke patients with hemiplegia cannot move their arm and leg on each side of the body. So this system is designed to classify between arm and leg. The upper limb and lower limb rehabilitation device are controlled from their motor imagery and feed back to user via rehabilitation device and virtual reality game. The rehabilitation system was design with facilitation and suitability for stroke patients.

Session: D1R1AL-Rehabilitation Engineering I

1570022601: Leap Motion®: Signal Preservation and Medical Training System

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Keywords:
EMG, Dyslexia, Leap Motion, Linear Interpolation, Leap Piano;

Abstract:
The objective of this work is develop the paradigm for training subject with dyslexia. Leap motion sensor used to develop the training program for subject's evaluation. This paper studies about fingers position data interpolation from Leap motion sensor. The fingers data used to control the visual hands to play a piano. Linear interpolation of Leap motion data show the signal smoothing than original signal. In term of high sampling rate (100Hz) the signal outcome has worse prognosis than lower sampling rate (1-10Hz).

Session: D1R1AL-Rehabilitation Engineering I

1570022961: Transcutaneous Electrical Nerve Stimulation based pain control system via Q-EEG validation

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Keywords:
Quantitative-EEG, Transcutaneous Electrical Nerve Stimulation, acute thermal pain, Visual Analog Scale, SpO2, Pulse Rate.

Abstract:
Pain is unpleasant sensory which is always a subjective measurement. Various studies try to find a solution to have life without pain. In critical situation, the treatment of burn patients need some criteria to understand a level of pain sensation. This study focuses on an acute thermal pain. The purpose of this study is to block the pain pathway using the transcutaneous electrical nerve stimulation (TENS). The results are validated using the visual analog scale (VAS), oxygen saturation (SpO2), pulse rate (PR), and the quantitative electroencephalogram (Q-EEG). The experiment is taken with normal healthy volunteers. During the experiment, acute thermal pain is stimulated by a hot thermal pad which can generate sixty degree Celsius. The TENS generates electrical stimuli for pain alleviation in high frequency (around a hundred hertz). The result of pain sensation during the used of TENS is mild while without using it give modulate sensation. The resulting oxygen saturation, pulse rate as well as the Q-EEG are also revealed synchronous results.

Session: D1R1AL-Rehabilitation Engineering I

1570022965: The Preliminary Study of EEG and ECG for Epileptic Seizure Prediction based on Hilbert Huang Transform

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Keywords:
Epilepsy; EEG; ECG; Hilbert Huang Transform;

Abstract:
Epilepsy is a chronic brain disorder. The patient are suffer from the unpredictable seizure. The conventional method for studies the characteristic of epileptic seizure is measuring the Electroencephalogram (EEG). On the other side, there are some studies reported about the relation between heart rate from Electrocardiogram (ECG) and epileptic seizure. This paper is a preliminary study about EEG and ECG based epileptic seizure prediction. The feature extraction method is based on the Hilbert Huang Transform (HHT) and we try to indicate some phenomena of EEG and ECG before the seizure onset. We extract the mean instantaneous frequency from EEG and R-R interval from ECG. The result shows the mean instantaneous frequency in mode one of intrinsic mode function was significantly dropped down simultaneously with R-R interval variation before seizure onset, the prior time is around 130 second. So, we can conclude that there is a possibility to use these two feature as a indicator for early prediction.

Technical Program

Wednesday, November 26, 2014 (Day-1)	
Room	Conference Room I
Session	D1R2AL-Medical Signal Processing II
Chair	Supan Tungjitkusolmun
14:45 - 15:00	1570022445 Varadach Amatanon
15:00 - 15:15	1570022465 K. Tharawadeepimuk
15:15 - 15:30	1570022543 Tick Sengthipphany
15:30 - 15:45	1570022627 C. Phamornnak
15.45 - 16.00	1570021965 Weichen Liu

Session: D1R2AL-Medical Signal Processing II

1570022445: Sign Language-Thai Alphabet Conversion Based on Electromyogram (EMG)

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Keywords:
Artificial Neural Network; feature extraction; EMG; sign language, finger spelling;

Abstract:
Communication and sign-language learning of the people with hearing disabilities in Thailand has been problematic due to limited number of sign-language experts. To facilitate the sign-language learning and communication between the hearing disability and ordinary people, the sign language-to-alphabet spelling conversion was developed based on electromyography (EMG) signal recorded from the forearm muscles. The EMG signal of 10

different Thai sign-language gestures were recorded with the electrode arrangement similar to the Myo device from Thalmic Labs and analyzed. To extract the distinct features of the EMG signals, moving variance and mean absolute value (MAV) were chosen. The extracted output data was processed with the classification algorithm via non-linear model (artificial neural networks (ANN)) to confirm that the EMG signal for each alphabet gesture is accurately matched with the actual spelling alphabet. The system is able to measure the match of the output with total accuracy of more than 95%.

Session: D1R2AL-Medical Signal Processing II

1570022465: QEEG Evaluation for Anxiety Level Analysis in Athletes

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Keywords:

Quantitative Electroencephalograpgy (QEEG); Anxiety; Asian athletes; Brain topographic map (Absolute power); Brain connectivity(Coherence); posterior head region;

Abstract:

There were two objectives of this paper. The first objective of this paper was to observe the brain activity of Asian athletes before the match. Second, the paper aimed to study the anxiety symptom showing on the brain via QEEG (Quantitative Electroencephalography) maps. The anxiety level for Asian athletes can be classified using the index of brain topographic map (Absolute power) relative to the normative database used for analysis. Firstly, Asian athletes have to complete revised competitive state anxiety inventory-2 (CSAI-2R) questionnaires. The Asian athletes then were recorded for their QEEG twice in 2 weeks (1 time/week) before competing in a match. In the competition, the anxiety symptom and performance of Asian athletes are observed and their feedbacks from the coach are asked. Lastly, the anxiety level is classified from results of QEEG maps, the CSAI-2R questionnaires and condition in the competition. The result of anxiety level showed that the quantity of alpha frequency band in posterior headerm of brain topographic map. In addition, amateur Asian athletes have lower quantity of alpha frequency band than the experienced Asian athletes when the time of competition becomes nearer. Furthermore, the focal area that showed in brain connectivity (Coherence) was presented in lower interactions between position to position in the frontal lobe.

Session: D1R2AL-Medical Signal Processing II

1570022543: Analysis of Heart Rate Variability and Breath to Breath Interval in Frequency Domain

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Keywords:
Heart rate variability (HRV); Breath to breath interval; frequency domain;

Abstract:
Respiratory is known to be a confounding factor of Heart Rate Variability (HRV) analysis. This article introduces a Breath-to-Breath Interval (BBI) spectral computation to investigate the insight between respiration and the HRV. Six males and five female volunteers (age 20-25 years) underwent the Electrocardiogram (ECG) and respiratory chest movement recordings for 5 minutes while sitting in resting condition. Auto Regressive Moving Average (ARMA) model was employed to the R-wave to R-wave interval (RRI) and BBI signals for the spectral analysis. The results from all participants demonstrate that the peak amplitude in high frequency (0.15-0.40 Hz) band are higher than the ones in low frequency (0.04-0.15 Hz) band in both RRI and BBI frequency plots. It suggests that respiratory plays a major role in HRV oscillation. Our further study is to develop a mathematical model to explain this finding.

Session: D1R2AL-Medical Signal Processing II

1570022627: The Low Frequency Ultrasonic Wave Caused Cell Lysis and Modulated Dielectrophoresis Property in Breast Cancer Cell Line

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Keywords:

ultrasonic wave; breast cancer; MDA-MB-231; dielectrophoresis;

Abstract:

Various methods of cell manipulation have been studying for cancer treatment. One of them is ultrasonic anipulation like sonodynamic therapy and high intensity focus ultrasound (HIFU). The effects of ultrasonic wave are divided into 2 types; hermal and non-thermal effect, which is generated by high and low frequency respectively. Low frequency of ultrasonic manipulation is very interesting because it promotes cell poration. In this study, human breast cancer cell line (MDA-MB-231) is stimulated by low frequency of ultrasonic wave. Two parameters were chosen; frequency and treatment time. The frequency of 70 and 100 kHz were generated by cup-shape probe and the treatment duration 15, 30, 45, 60, 75, 90, 105 and 120 min were employed. After ultrasonic exposure, the cell morphology was observed by microscope, the cell viability and number of cell were observed by trypan blue staining. Moreover, bioelectrical property of cell was determined by changing dielectrophoresis (DEP) phenomenon, which is determined in term of negative (nDEP)

and positive (pDEP). The results showed the cellular debris and decreasing the amount of cell number can be observed at the duration 105 and 120 min of ultrasonic exposure times. On the other hand, the changing of DEP property is started at 15 min of ultrasonic exposure time. So, these results confirm that bioelectrical property of cell may be changed before biological behaviors are occurred. Finally, the nDEP property of cancer cell is modulated by low frequency ultrasonic wave. The tendency of nDEP is depended on exposure time and the long ultrasonic exposure time can make the cell lysis.

Session: D1R2AL-Medical Signal Processing II

1570021965 : High-frequency Ultrasound Doppler Detection using Fundamental Pulse Inversion Technique

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Keywords:

igh-frequency ultrasound Doppler estimation; Swept-scan mode; Tissue spectral broadening; Micro-bubble contrast agent; Pulse inversion;

Abstract:

Swept-scan imaging mode is often utilized in highfrequency ultrasound Doppler estimation of blood flow. However, tissue spectral broadening effect in swept-scan system severely limits the detection of low-velocity flow especially at high scanning speed of motor. To alleviate the effect of wall filtering on low-velocity blood signal, the suppression of tissue Doppler signal using micro-bubble contrast agent and non-linear imaging can be helpful. With the method of fundamental pulse-inversion Doppler (FPID), the non-linear bubble signal can be isolated from the linear tissue signal at fundamental frequency by lowpass filtering in the Doppler domain to reduce the clutter interference. Results show that the FPID helps to retain the lowvelocity blood flow signal in color Doppler imaging nd thus improves the efficacy of blood flow detection. With different lateral scanning speed of motor (Vmotor), the values of color-pixel density (CPD) with FPID are 0.63 (Vmotor = 4mm/s), 0.65 (Vmotor = 8mm/s) and 0.58 (Vmotor = 16mm/s). It shows that FPID is less susceptible to the tissue spectral broadening effect. The results also show that, with FPID method, the flow signal-to-clutter ratio (SCR) increases by 7.7dB ($P < 0.001$) and the CPD increases by 20 % ($P < 0.001$) in the case of 3mm/s of blood flow velocity and 16mm/s lateral scanning speed of motor.

Technical Program

Wednesday, November 26, 2014 (Day-1)	
Room	Conference Room II
Session	D1R3AL-Biomechanics&Biomaterial
Chair	Phornphop Naiyanetr
14:45 - 15:00	1570020467 Sani Boonyagul
15:00 - 15:15	1570022043 Saki Shimizu
15:15 - 15:30	1570022049 Soichiro Watanabe
15:30 - 15:45	1570022597 Udomporn Manupibul
15.45 - 16.00	1570022621 Jutamanee Poonsiri
16.00 - 16.15	1570022629 Pitchaya Rayothee

Session: D1R3AL-Biomechanics&Biomaterial

1570020467: Physical Properties and Biocompatibility of Acemannan Scaffold for Biomedical

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Keywords:
Aloe Vera, Acemannan, Biocompatibility, chemical crosslink, Scaffold, Sponge, Biomedical materials;

Abstract:
The aim of this study is to synthesize the biocompatible acemannan scaffold for biomedical application by chemical–crosslinked method. Adipic acid and CDI were employed as a crosslinker and a coupling agent, respectively. The three dimensional porous structure was constructed by the salt leaching method and then with freeze-dried process. Crross-linking analysis and surface morphology were examined by infrared spectroscopy and scanning electron microscope, respectively. Swelling rate and In Vitro degradation were determined by the ratio of weight changes. For biocompatibility test, the specimens were incubated with osteoprogenitor cell line, ST2. Cell viability was tested by biochemical assay of Presto BlueTM. The result shows that the amount of adipic acid affected on the swelling rate and in vitro degradation Biochemical assay demonstrated that acemannan scaffold exhibited biocompatibility by incubated with ST2 cells. These data suggest that

adipic acid could be used as a crosslinker which affected on physical properties of ace-mannan scaffold. Moreover, the synthesized sponges have biocompatibility in In vitro level as well as can potentially be used in biomedical application.

Session: D1R3AL-Biomechanics&Biomaterial

1570022043: Effectiveness Evaluation of Waist Support Tool through Human Posture Balance

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Keywords:
Waist support tool, Human posture balance, Effectiveness evaluation,
Wii balance boar;

Abstract:
A lot of carrying workers wonder whether it is good to wear a waist support tool to protect the waist or not. Although the qualitative analysis of waist support tool is generally used for the evaluation, there is not yet the evaluation of quantitative analysis. In this paper, we proposed the method of quantitative analysis in order to evaluate the effectiveness of waist support tool through human postural balance. Through we measured the trace of Center of Pressure (CoP) by using the Wii balance board, we proposed the method to estimate the bending angle and sway angle of human upper body through the analysis of the human balance. Through the analysis, we found that the participant under the condition of wearing the waist support tool had the initial smaller bending angle, and he also had the smaller sway angle during lifting the load. That meant that the waist support tool helped the initial bending motion, and also the participant made less from side to side.

Session: D1R3AL-Biomechanics&Biomaterial
1570022049: A Difference of Human Posture between Beginner and Expert during Lifting a Heavy Load

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Keywords:
Human posture balance, Bending angle, Beginner and expert, Wii balance board, Kinematics;

Abstract:
We focused on what is the difference of human posture during lifting a heavy load between a beginner and an expert who has been working in the logistics industry. Although there have been a lot of studies to analyze the human motion through the mathematical modeling, we proposed the method to estimate the bending angle of human upper body through the analysis of the human balance by using the Nintendo wii balance board in order to find out the cause of low back pain in the logistics industry. The proposed method has a good point to measure without the limitation of environment. We analyzed two experts and two beginners without the low back pain in the logistics industry in order to make sure the difference between an expert and a beginner. Through all of analyses, we found that experts had an approaching motion to the load with the less bending angle, and they had the slower unbending motion than that of beginner during lifting the load. That meant that experts bended down to pick up the load with the less bending angle, and they stood up with the slower motion while lifting the load. Thus, experts became the faster steady state than beginners.

Session: D1R3AL-Biomechanics&Biomaterial

1570022597: Design and Development of SMART Insole System for Plantar Pressure Measurement in ImbalanceHuman Body and Heavy Activities

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Keywords:

insole system; center of pressure; pathomechanical dysfunction; graphical user interface; Visual C#;

Abstract:

Body balance and center of pressure (COP) of the human body are extensively studied to assist the patients who loss of the body balances. Many medical devices are developed to detect the human body imbalance and to measure COP. This research presents a new medical device to measure the plantar pressure distribution. The device is capable to monitor the physical body balance, to identify the pathomechanical dysfunction, to evaluate the treatments, and to improve sport skill performance. It is designed in the feature of the insole system which consists of the force sensors, microcontroller, and wireless module integrated with the real time graphical user interface (GUI) on Visual C# program. The insole system is able to measure the plantar pressure distribution, and is able to collect the force data for evaluating the treatment. It is able to use in heavy activities such as jumping and running. This system uses the wireless system for communicating between the insoles and the graphical user interface in PC, laptop, and smart phone.

Session: D1R3AL-Biomechanics&Biomaterial

1570022621: Biomechanical Based Design of an Active Knee Ankle Foot Orthosis to Augment the Knee Motions

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Keywords:
orthosis, KAFO, biomechanic, gait;

Abstract:
Many people have lower limb paralysis from different reasons and many Thai patients were prescribed by passive orthoses although some active orthoses have been invented[1-5] for more natural and smooth gait because of augmentation and control of weak motions for the paralyze people, but the price is expensive and difficult for Thai disables to access. The objective of this study is to develop the active orthosis that help empower knee motions for weak knee extensor patients. One normal subject participated and walked with the developed device for three rounds in order to see if the desired knee angle and power is achieved. The knee angles were measured and compared with normal data of knee angle during a gait cycle. The design criteria were achieved but further improvement should be done for the future study.

Session: D1R3AL-Biomechanics&Biomaterial

1570022629: Design and Analyses of Stress – Strain Distribution in New Coupling for Lower Limb Prosthesis (CLLP)

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Keywords:
Prosthetic coupling, lower limb prosthesis, endoskeleton and exoskeleton prosthesis;

Abstract:
The prosthesis is the device which replace the missing part or structure, can be inside or outside the human body. The prosthetic alignment is the method to find the optimal prosthetic function and a very important for efficiency and effectiveness delivery of the prostheses. Good alignment can reflex the better of gait pattern, more natural of gait cycle and less energy consumption during locomotion. Coupling is an additional component which uses for increasing the capacity of alignment adjustability. The objective of project is to develop the new coupling design which is easy to do adjustment, light weight, can be used for endoskeleton and exoskeleton prostheses, extensive adjustment and inexpensive price. The aim of the study has been focusing on the design and analyses of stress – strain distribution in new coupling for lower limb prosthesis (CLLP) using finite element method. The component is designed by using SolidWorks program and analyzed by COSMOSWorks program in order to study the stress - strain distribution. The result of the study has shown that the maximum of stress and strain is 22.64 MPa and 5.55 KPa at the screw connection area respectively. Moreover, displacement and deformation on the component is not

present. For the result of the range of alignment adjustability, the maximum of anterior/posterior and medial/lateral translation is about 2 centimeters on each direction, 45 degree in medial rotation and 45 degree in lateral rotation. Further study is going to focus on the mechanical testing and clinical trial with the transtibial and transfemoral amputee.

Technical Program

Thursday, November 27, 2014(Day-2)

Room	Hall I
Session	D2R1ME-Medical Image Processing II
Chair	Wibool Piyawattanametha
9:30 - 9:45	1570022249 W. Piyawattanametha
9:45 - 10:00	1570021881 C. Phromsuthirak
10:00 - 10:15	1570021911 Somsri Daochai
10:15 - 10:30	1570022569 C. Panyindee
10:30 - 10:45	1570022531 Samart Tuamputsha

Session: D2R1ME-Medical Image Processing II

1570022249: Portable holgraphic imager for biological samples

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Keywords:

hologram; automatic detection; portable imaging platform;

Abstract:

A portable holographic imaging platform combining with an automatic micro-objects detection algorithm is demonstrated for biological samples. All components of the imaging platform are aligned to one another along the same optical axis, provides many advantages such as large field-of-view, simple optical setup, and no optical aberration. Main features in the software are feature detection and counting. The average overall computational time is of 52.37 seconds, specificity and sensitivity of our algorithms on a 2593x1944 pixels hologram are 0.978 and 0.923 respectively. Although the algorithm is not optimized, the technique here only focuses on the detection and counting problem

Session: D2R1ME-Medical Image Processing II

1570021881: Hand Shape Identification using Palmprint Alignment based on Intrinsic Local Affine-invariant Fiducial Points

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Keywords:
Palmprint identification; Palmprint alignment; Convex hul;

Abstract:
Palmprint is the mostly popular biometrics used in security system. However, it is difficult to acquire the palmprint features with the common problems of pose, lighting, orientation, gesture etc. of palmprint image. So, these problems have the effect to reduce the level of confidence in personal authentication. In this paper, we proposed a new hand shape identification using palmprint alignment without guidance pegs algorithm for improving the level of confidence in palmprint identification system. The palmprint alignment based on a set of fiducial points which are intrinsic, local and preserved under affine transfor mation. The fiducial points are relative affine invariant to affine transformations, they allow

for alignment where position of the palm relative to camera orientation can be arbitrary set. Moreover, before palmprint alignment process, the web camera which was used to capture the palmprint image was calibrated by Camera Calibration Toolbox developed by JeanYves Bouguet. The performance of the identification algorithm was tested in 2 types: intra-class identification and inter-class identification. The intra-class identification has the most of distance map error was started from 1.4 pixels to 4.5 pixels and the inter-class identification has 18 percent equal error rate.

Session: D2R1ME-Medical Image Processing II

1570021911: Using a combination of 2- planes in ultrasonographic guidance for internal jugular vein cannulation . A Prospective Sequential Comparison

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Keywords:
temporary hemodialysis access ; internal jugular vein cannulation; Short axis; Long axis; a static ultrasonographic guidance;

Abstract:
This study has been launched that will assess whether a novel imaging-guided for internal jugular vein cannulation is beneficial to enhance patient safety and feasible to daily practice for internal jugular vein cannulation. The effectiveness and accuracy of a prospective before (phase 1) versus after (phase 2) was compared, whereby single plane approach was employed in the first phase and the second one was approached by a fusion of short and long axis technique. The result found an intervention practiced on a combination of imaging planes had a significantly higher the success rate at the first attempt [Odd ratio: 3.5, (95% CI: 1.1-10.9), p =0.03]. A novel guidance approach is easy-to-implement solutions for improving safety.

Session: D2R1ME-Medical Image Processing II

1570022569: Reversible Data Hiding Scheme Using Optimal Weight Predictor Based on DMT in Medical Imaging

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Keywords:

Reversible data hiding; double modification testing (DMT); optimal weight predictor (OWP);

Abstract:

The progress of internet technology, especially in medical, information can be transmission across in real-time allowing medical practice through tele-diagnosis. Meantime, ensuring the security of transmitted medical information, including between protection and reliability guaranties, becomesa challenging. This work presents an effective reversible data hiding technique for the medical imaging modalities. The optimal weight predictor is introduced which can predict to be more accurate than the conventional predictor. The proper weight value enhances the performance of the prediction. We employ prediction errors to embed data into an image. A data sorting technique is used to record the prediction errors according to magnitude of its local variance. The pixels in an image is checked using a technique which will be referred double modification testing, where each pixel is an attempt to embed a test bit. Experimental study is carried using several medical images, and the results are compared with well-known method in the literature.

Session: D2R1ME-Medical Image Processing II

1570022531 : The Development of Semi-Automated Radiopharmaceutical Dispenser using Real-Time

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Keywords:
Radiopharmaceutical Dispenser Semi-Automation; Real-Time Video Processing;
Volume Measurementcomponent;

Abstract:
This paper presents the development of a semiautomated radiopharmaceutical dispenser using real-time video processing. Typically, a fully-automated radiopharmaceutical dispenser is expensive while a manual dispenser is harmful to operators due to radiation exposures. In the proposed system the video camera sends the real-time video signals of the [18F]-Fluorodeoxyglucose ([18F]-FDG) volume in a 5-ml syringe to a computer and the volume detection is subsequently performed through video processing using MATLAB. Air is slowly pushed through an extension tube from a micro air pump to the [18F]- FDG vial until the 5-ml syringe plunger is moved to reach the [18F]-FDG required volume automatically. The computer subsequently displays an automated calculation volume of [18F]- FDG for the operator that help a better vision of the volume of [18F]-FDG and therefore a one-time operation is sufficient. The proposed system offers a potential alternative to high-cost commercial radiopharmaceutical dispenser achieving a high precision and reducing operator's radiation exposure.

Technical Program

Thursday, November 27, 2014(Day-2)

Room	Conference Room I
Session	D2R2ME-Healthcare Information Sysem
Chair	Adisorn Leelasantitham
9:30 - 9:45	1570011259 Lichin Chen
9:45 - 10:00	1570019309 N. Singkhleewon
10:00 - 10:15	1570019901 Bo-Chiang Huang
10:15 - 10:30	1570022305 K. Lerdwuttiaugoon
10:30 - 10:45	1570022587 Parinya Otarawanna

Session: D2R2ME-Healthcare Information Sysem

1570011259: Evaluating the Requirements of Patients with Heart Diseases in a Telehealthcare Service

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Keywords:
Telecare; telmedicine; heart disease; information system; phone call; call center;

Abstract:

Telehealthcare has the potential to extend healthcare services beyond border. The needs of patients and the way patients use such services are worth investigating, however, few of the previous work discussed the requirements of patients within telehealthcare services and the way patients use such kind of service. This study investigates patient requirements through analyzing the phone call records. The phone calls to and from the patients indicates their problems. Through analyzing the phone call records, we are able to understand more about the needs of patients and track their problems. The data of 188 patients were collected. And the frequencies of the phone calls were compared to patient demographic variables and diagnosis. The result shows that the older the patient is, the more they use phone call services; the longer a patient entered the telehealthcare program, the fewer calls they make. Patients with heart failure call more frequently than patients with other cardiovascular diseases. It is meaningful to explore the needs of patients and to improve telehealthcare services based on patient experiences.

Session: D2R2ME-Healthcare Information Sysem

1570019309: A Development of Medical Equipment Registration and Spare Part Module in WepMEt System for Medical Equipment Management in Thai Hospital

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Keywords:

Medical equipment registration module, Spare part reserve module,
medical equipment database system, medica equipment management system,
Web-based application program;

Abstract:

This research purposes to develop a medical equipment registration and spare part reserve module which is an important basic component in the WepMEt (Web application for medical equipment management in hospital) program set. This is a main assistive device for medical equipment management in a general hospital. This program is developed as a Web-base application toolwhich applying a decision supporting system, industrial engineering technique and experience in a real situationin a program development process. Those concepts are conformed inorderobtain the program set that response to context and medical equipment management process in Thai and also concerning a hospital quality assurance. Synthesis process of main information for medical equipment registration system and spare part reserve system is performed by group criticizing of medical equipment management expertise. The programdevelopment is based on a rapid prototype technique. This program set is tested by recording of 3,512 items of medical equipment from 75 departments, 50 equipment types. The evaluation shows that our program set compatibly response to Firefox browser and able to attach electronic file into database and also able to create and print a bar-code for supporting a program operation.

Session: D2R2ME-Healthcare Information Sysem

1570019901: A Healthcare-associated Surgical Site Infection Surveillance and Decision Support System

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Keywords:
surgical site infection, surveillance system;

Abstract:

Surgical site infection (SSI) is a long-term issue in the hospital and contributes to patient deaths and disability. Also healthcare-associated SSI (HASSI) increases healthcare costs and extend hospitalization stay, so prevention of HASSI is one of the most important points in infection control. However, the current manual surveillance method is error prone and time-consuming. To increase the efficiency of healthcare-associated SSI surveillance and evaluate different detection rule using different data sources (antibiotic prescription, microbiology laboratory, discharge diagnosis codes, surgical report, and symptoms & physical examination), the HASSI surveillance system was developed. According to the preliminary results, the rule-based SSI systems of antibiotic prescription and microbiology laboratory acquires 89% and 85% sensitivity, respectively. Electronic medical records from September 2013 through December 2013 of 7849 inpatients were detected by differentdefined rules of HASSI. The performance analysis of this surveillance system was calculated by comparing the manual reviewed HASSIs. Hence, The HASSI system decreases the number of patients need to evaluate by infection control personnel (ICP) and significantly improves the efficiency of HASSI detection.

Session: D2R2ME-Healthcare Information Sysem

1570022305: Wireless Electrocardiogram Monitoring using Mobile Network Communication

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Keywords:
Electrocardiogram; Android application; Mobile network; Wireless monitoring;

Abstract:
Wireless monitoring system is the effective and convenient tools in medical field nowadays. It is widely applied to many physiological parameters such as Electrocardiogram (ECG), Electroencephalogram (EEG), etc. This paper proposes a low cost wireless 1-lead ECG monitoring system that transmits the information to the database server via the mobile network. Our designing system consists of the ECG monitoring circuit, microcontroller circuit and Android mobile phone. The microcontroller interfaces to Android mobile phone via Bluetooth protocol, and the information is transmitted to the database server via FTP protocol. The information was displayed and accessed by the web-service system via the internet protocol. The heart rate accuracy was tested by ECG simulator at different beats per minute. The maximum error and standard deviation are 0.83% and 2.35 respectively.

Session: D2R2ME-Healthcare Information Sysem

1570022587:RSSI-Based Positioning for Health Care Service Using Artificial Neural Network Approach

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Keywords:
Positioning System; ZigBee; Wireless Sensor Network; Artificial Neural Network; Health Care Monitoring;

Abstract:
the fluctuation of received signal strength indicator emerges poor accuracy in healthcare location monitoring service. To enhance the capability of position classification, this paper represents positioning system based on ZigBee standard using artificial neural networks algorithm. Time-delay Multi-Layer Perceptron is proposed by using Levenberg-Marquardt optimization. For the result, the average error of four empirical experiments reaches to 7 centimeters with 1.5 square meters grid resolution. The reduction of grid scale in order to extend output resolution is also a limitation for RSSI-based positioning due to an uncertainly and ambiguity of RSSI vector.

Technical Program

Thursday, November 27, 2014(Day-2)

Room	Conference Room II
Session	D2R3ME-Biomedical Instrumentation I
Chair	Arthorn Sanpanich
9:30 - 9:45	1570021833 Arthorn Sanpanich
9:45 - 10:00	1570022651 C. Rungsirikunnan
10:00 - 10:15	1570023709 K. Kujaroentavon
10:15 - 10:30	1570024121 Khanittha Kaewdang

Session: D2R3ME-Biomedical Instrumentation I
1570021833: Thermal Ablation for Cancer Treatment by using Microwave Energy in a Simple Lung Model

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Keywords:
Microwave thermal ablation, simple lung model, temperature distribution simulation;

Abstract:
Lung cancer or pulmonary cancer is one of a dangerous cancer threatening human life since a long time ago. Even though, a conventional surgery is widely accepted as a gold standard for this cancer treatment, however a new medical maneuver still be investigated to perform with this disease. In this paper, we trail a simulation of thermal ablation by using microwave energy at 2.45GHz, 30 Watts for 10 seconds with an opened-ring coaxial applicator in a simple lung tissue model. An air tracheal also placed in this model inorder to compare for a thermal distribution. Although, this model is quite differing from a porous material, but our simulation results of temperature distribution and destructive area at 60 C guide us some useful information for a real ex vivo with swine tissue in the near future work

Session: D2R3ME-Biomedical Instrumentation I

1570022651: Control system design for external continuous flow centrifugal VAD

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Keywords:
Ventricular Assist Device; Fuzzy Logic control;

Abstract:
Ventricular assist device (VAD) is used in heart failure patient. VAD works instead of heart function. The disadvantage of current VAD is a constant pump speed that is manually adjusted. However, the constant of pump speed is not providing the constant of pump flow. Therefore, the flow control or manually adjust is an important for maintain blood circulation in patient. In this research, the automatic system that can maintain both pump flow and head pressure (arterial blood pressure related) was developed by using control system method, so it makes the patient be safe from abnormal symptom. In hardware part, the flow rate was collected by the ultrasonic flow sensor and the head pressure was collected by the fluid fill pressure sensor. All signals were transmitted to microcontroller for analog to digital conversion. A microcontroller was programed with the control algorithm. Microcontroller controls the input power of VAD's motor that related to VAD speed. Personal computer was used as control panel and display. For control system part, Fuzzy

Logic control was used as control algorithm. The system maintains the flow rate or head pressure. The system was tested on mock circulation loop. The mock circulation loop simulates the condition of body circulatory system. After tuning and improvement of controller, both pump flow and head pressure can be maintained. However, the timeresponse was not spontaneously after the outflow pressure has changed. The pressure response has high overshoot when systemic resistance increases. The flow rate response has high settling time when the systemic resistance has increases. Therefore, the control algorithm needs to improve for reducing both the pump flow and head pressure responses.

Session: D2R3ME-Biomedical Instrumentation I

1570023709: Air Quality Classification in Thailand Based on Decision Tree

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Keywords:
air quality, Model, Classification, Levels of Healthy Concern, Decision Tree, air quality, Model, Classification, Levels of Healthy Concern, Decision Tree;

Abstract:
The paper presents a model for management classifie air quality by algorithm of decision tree using air quality index in Thailand including a pollutant's concentration e.g. O3, NO2, CO, SO2, PM10 and levels of healthy concern. The purpose of this research is to establish rules of separated air quality classification by levels of healthy concern. The results of this study are correctly classified into instances of training set of 96.80% and testing set of 91.07%. The

ROC curve shows that the training set data and testing set data are similar to such results. The algorithm of decision tree can use to become rules of separated air quality classification by levels of healthy concern.

Session: D2R3ME-Biomedical Instrumentation I

1570024121: ±0.5V electronically and linearly tunable CMOS transconductor for low-voltage applications

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Keywords:

low-voltage low-power; CMOS transconductor; linearly tuned;

Abstract:

This paper proposed a CMOS circuit technique for realizing an electronically and linearly tunable transconductor for low-voltage low-power applications. The realization technique is achieved by squaring the transconductance gain (gm) of the CMOS OTA. Its input stage is design based on the dynamic threshold voltage transistor (DTMOS) for low-voltage, low-power transconductor. Its gm can be linearly tuned by an external bias current for more than 3 decades (100nA-400 μA), with less than 3% nonlinearity for the input-voltage linear range of about 0.15Vp. The proposed transconductor operates under low supply voltage of ±0.5V.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Hall I
Session	D2R1ML-Rehabilitation Engineering II
Chair	Yodchanan Wongsawat
11:00 - 11:15	1570022459 Dollaporn Anopas
11:15 - 11:30	1570022485 Trisak Yamsa-ard
11:30 - 11:45	1570022607 T. Prasertsakul
11:45 - 12:00	1570022963 Wachara Sroykham
12:00 - 12:15	1570001907 Hieyong Jeong

Session: D2R1ML-Rehabilitation Engineering II

1570022459: Virtual Reality Game for Memory Skills Enhancement Based on QEEG

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Keywords:
Neuronal activity, QEEG, Virtual reality, Neuroplasticity;

Abstract:
From the past to the present, brain development has been very popular for education. Therefore, many journals and theories about neuroscience, psychology, neuroimaging and physiotherapy have played a key role in brain enhancement. Virtual reality is well known as an efficient motivation to enhance motor function. However, much research only proved that there were more immerse and motivate method than conventional way. Hence, which kinds of a procedure have an absolute outcome in brain enhancement? This research will focus on a method that has a high quality in memory development to improve neuroplasticity. Moreover, virtual reality will be developed via Unity which is game engine for developing 2D and 3D game to support a neuronal activity. Quantitative electroencephalogram (QEEG) will be used to prove the result of memory enhancement during training because QEEG reveals topography of frequency band as well as the brain connectivity. Finally, virtual reality game, which is integrated with the neural activity, is compared with the conventional game via QEEG. The aim of this research is to develop the virtual reality that is supported with the neuronal activity for memory skill and to create the simple virtual reality for real brain enhancement.

Session: D2R1ML-Rehabilitation Engineering II

1570022485: The relationship between EEG and binaural beat stimulation in meditation

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Keywords:
Meditation, Electroencephalogram, EEG, binaural beat, meta-music;

Abstract:
The difficulty to understand meditation is the lack of exact methodology, replication of mind condition and depends on individual meditative practice. From these reasons, this research focuses on a relationship between meditation and EEG. The Quantitative EEG will be analyzed and observed in absolute power of each EEG rhythm. Coherence was also analyzed after participants practice meditation during binaural beat stimulation in both eyes-closed and opened four beat frequencies were selected, 5 Hz, 8Hz, 12Hz, and 18Hz respectively. The binaural beat stimulation will be classified into two groups which are pure beat and meta-music that combined binaural beat with other music. The result demonstrates that coherence is the significant index that shown the relationship between EEG and meditation. Theta and lower alpha absolute power also show the significant relationship which increase at frontal-midline. This research demonstrates that, coherence and absolute power are indices which can explain a meditation practice during binaural beat stimulation.

Session: D2R1ML-Rehabilitation Engineering II

1570022607: Defining the Rehabilitation Treatment Programs for Stroke Patients by Applying Neural Network and Decision Trees Models

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Keywords:
data classification; rehabilitation program; neural network; decision trees; stroke;

Abstract:
At present, patients whose have suffered from stroke in Thailand are increasing every year. Stroke impairments relate to many functions such as sensory, motor function, communication, visual and emotional function which depend on brain's lesion. Physical examinations and assessments are important for planning the rehabilitation programs. For this reason, there are several information for medical decision making. Missing some data for treatment planning may occur. To solve this problem, the proposed study used two algorithms to determine the proper rehabilitation treatment program. Artificial Neural Networks and Decision Trees models were considered. Sensitivity, specificity and accuracy values were computed to define the performance of both algorithms. The results of this study indicated that both techniques can apply for data classification and define the proper treatment programs. However, the results were shown that the specificity and accuracy of decision trees model were higher than neural network model.

Session: D2R1ML-Rehabilitation Engineering II

1570022963: The Red and Blue Rooms affect to Brain Activity, Cardiovascular Activity, Emotion and Saliva Hormone in Women

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Keywords:
Red color, Blue color, Brain activity, Cardiovascular activity, Emotion, melatonin, cortisol, testosterone, progesterone, estradiol and DHEAS;

Abstract:
The color and light have effect on physiology, psychology, cognitive performance and hormone production in the human. In this paper, we aim to study red and blue color with their effect on brain activity, cardiovascular activity, emotion and saliva hormone. Each participant

was testing in red and blue room. Participant was measure the EEG, ECG, SpO2, pulse rate, saliva hormone (melatonin, cortisol, testosterone, progesterone, estradiol and DHEAS), and emotion. The results showed that red room regulates the tension, anger, vigor and confusion moods which stimulate significant increasing of the pulse rate and SpO2 and cortisol levels but blue room regulates the depression and fatigue. The brain activity of high beta wave (25-30 Hz) was high at the occipital lobe and little high at frontal lobe in red room but the blue room was high at frontal lobes only. The coherence of high beta wave was not difference in both rooms. The Gonadal and melatonin hormone were not clearly changing in red and blue room.

Session: D2R1ML-Rehabilitation Engineering II
1570001907 : Optimization of Workspace through Perturbation Analysis of Rehabilitation Cable Robot

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Keywords:
Perturbation analysis, Lineear independence, Singular value sensitivity, Workspace analysis

Abstract:
It is well known that planar robots may have singular configurations that can result in a losss of full control the mechanisms. In fact, the uncontrollable area iss existed as close to singularity, although the robot is operated innside the analyzed workspace. According to the distance to singgularity, this comes from the difference of the sensitivity of singgular values to be changed easily through the disturbancee. However, the conventional workspace analysis estimated byy cable tensions has a difficulty giving you the information oof singular value sensitivity. In this paper, we focus on the optimization of workspace through perturbation analysis, wwhich estimates the quantity of linear independence for singularr value sensitivity. Accordingly, we show the method of perturbaation analysis for a 3-DOF cable-driven parallel robot, and then siimulation results of optimized workspace to be made change bby the acceptable quantity of perturbation.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room I
Session	D2R2ML-Tissue Engineering& Cardio Vascular
Chair	Jan Lauwereyns
11:00 - 11:15	1570022315 Ravi Laohasurayodhin
11:15 - 11:30	1570022721 R. Deepankaew
11:30 - 11:45	1570023739 Jittrawan Thaiprasit
11:45 - 12:00	1570024059 A. Parnsubsakul
15:15 - 15:30	1570023893 K. Viravaidya-Pasuwat

Session: D2R2ML-Tissue Engineering& Cardio Vascular

1570022315: Computational Fluid Dynamics Analysis and Validation of Blood Flow in Coronary Artery Bypass Graft Using Specific Models

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Keywords:
CABG, Anastomosis, Hemodynamics, IH, CFD;

Abstract:
Coronary Artery Bypass Graft (CABG) is the full name of bypass surgery method in coronary artery. There are two common bypass techniques which are individual technique and sequential technique. After bypass surgery, the bypass grafts seem to be obstructed in distal anastomosis between graft and host vessel. This obstruction in CABGs has been purposed as a factor from irregular hemodynamics, causing development of intimal hyperplasia (IH). The aim of this project is to use computational fluid dynamics (CFD) method to simulate geometrical and physical parameters in different coronary arteries' techniques. Results from CFD are important for describing the future of graft failure. First, CFD program need to be evaluated to find the best suitable setup for coronary simulation. The CFD software, ANSYS, was simulated in parallel with experiment results. The experiments are set and studied

base on simple models. According to studying in simple models, the validation method was tested in 3D printing models with the same geometry and boundary conditions parameter as in ANSYS's models. In conclusion, the validation results trend to approve our set up of coronary arteries' models in ANSYS. User defining function are created in order to calculate hemodynamic parameters in simulation models. These hemodynamic results from CFD are related to hypothesis of graft failure. Results from two CABG techniques were compared to each other. It shows that Sequential technique has more appropriate hemodynamics parameters in distal junction than individual techniques.

Session: D2R2ML-Tissue Engineering& Cardio Vascular

1570022721: The simulation ofcardiovascular system for physiology study sing Specific Models

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Keywords:

Cardiovascular System, Hemodynamic, Lumped Model, Simulation;

Abstract:

In this simulation, the cardiovascular model was developed base on the physiological study. The parameter identification and validation was done with physiological data using Matlab/ Simulink. This study has adopted the principle differential equation using analog-lump parameter model. The wave forms such as pressure, volume and flow in cardiovascular system were simulated. The simulation of cardiovascular system for physiology study was composed of three main parts: 1) heart,2) systemic vascular system and 3) the pulmonary vascular system, all of the system through mapping the physiological parameters to the electrical analog elements (resistor, capacitor and inductor and diode) for the characteristic of the system in normal and pathophysiological conditions. From simulation, the physiological waveforms showed that the pressure, volume and flow were estimated when compared with general information published in physiological reports. These results also indicate the possibility of the application of cardiovascular system model for using in the physiological studying.

Session: D2R2ML-Tissue Engineering& Cardio Vascular

1570023739: Domain-based design platform of interacting RNAs: A promising tool in synthetic biology

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Keywords:
Synthetic RNA; RNA-RNA interaction; hamming distance; thermodynamics;

Abstract:

Interacting RNA-based devices have increasingly gained interest among synthetic biologists due to their potential applications in biotechnology and medicine. However, the effort to create novel interacting RNA-based devices has been hampered by the difficulty in designing efficient interacting RNA molecules with desired structures and functions. In this work, we propose a newcomputational platform that efficiently designs interacting RNAs that can fold into specific shapes. This platform combines interacting domain-based decomposition (iDoDe) and the Domainbased Design (DD) program to randomly generate both individual and hybridized RNA sequences following a user's requirement. In addition, the platform includes the Vienna RNA package that predicts the secondary structures and the minimum free energy (MFE) of the designing sequences. In this paper, the proposed platform is demonstrated using 4 artificial models of interacting RNAs with different structures. Using the similarity and the stability scores as the design criteria, it is found that our design platform is able to randomly generate many interacting RNAs that are perfectly matched to each of the four target structures with acceptable stability. Although this platform offers a great potential for designing interacting RNAs, it still needs further development that integrates an optimization algorithm to efficiently provide optimal sets of interacting RNAs.

Session: D2R2ML-Tissue Engineering& Cardio Vascular

1570024059: Mesoporous Hybrid Membrane based Labe Free Electrochemical Immunoassay

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Keywords:
Mesoporous hybrid membrane; label-free electrochemical sensor; immunoassay; Salmonella typhimurium;

Abstract:
We demonstrated an application of a mesoporous-silica hybrid membrane (MHM) toward label free electrochemical immunoassay. Mesoporous silica oriented parallel in the co-lumnar pores of a commercial anodic alumina membrane was firstly prepared. The hybrid membrane was further functionalized with antibiodies and followed by interacting with pathogenic samples through immunorecognition event. The sensing mechanism relies on the pore blocking from bound bacteria. The blockage could be traced by measuring the decrease in differential pulse voltammetric (DPV) current of ferrocenecarboxylic redox indicator. Herein, we are interested in proof of the concept on characterization of the

constructed membrane, testing immunoreactivity on the membrane by ELISA and the detection of the target. The results showed the potential advantage of using this composite nanomaterial for enhancing the sensing response in the application of label free immunoassay.

Session: D2R2AL-Other BME Related Fileds

1570023893: Effect of Light-Emitting Diode Wavelengths on Human Dermal Fibroblasts for Phototherapy

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Keywords:
LED stimulation; LED wavelengths; human dermal fibroblasts; cell proliferation; collagen type I

Abstract:
Recently, light-emitting diode (LED) technology has been utilized by a large number of dermatologists to promote rejuvenation in patients with aged and photoaged skin. One of the most important parameters influencing the therapeutic effects of LED is its wavelength. In this study, we have developed an LED stimulation compartment to study the effect f the light at 630, 680 and 830 nm on human dermal fibroblast proliferation and their expression levels of collagen type I. Significantly higher proliferation rates were observed in the fibroblast culture irradiated with LEDs. Specifically, red light (630 and 680 nm) yielded higher cell numbers, in comparison to infrared light (830 nm), which could be effectively used to stimulate the healing process and promote rejuvenation. Interestingly, 680 nm LED was shown to increase the level of collagen type I in dermal fibroblasts which could eventually lead to higher production of collagen, an important structural

protein responsible for youthful skin appearance. Our findings suggest that 680 nm LED had a photo-therapeutic effect towards human dermal cells which could potentially be used to treat aged and photoaged skin.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room II
Session	D2R3ML-Biomedical Instrumetation II
Chair	Sumet Umchid
11:00 - 11:15	1570022151 Sumet Umchid
11:15 - 11:30	1570017943 N. Thongpance
11:30 - 11:45	1570022481 N. Jirakittayakorn
11:45 - 12:00	1570022505 P. Phasukkit
12:00 - 12:15	1570022523 N. Laowattanatham

Session: D2R3ML-Biomedical Instrumetation II

1570022151: Measurement of the Field Characteristics from High Intensity Focused Ultrasound Transducer

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Keywords:

Ultrasound Metrology; Ultrasound Field Characteristics; Ultrasound Field Measurement; Biomedica Ultrasound; High Intensity Focused Ultrasound (HIFU);

Abstract:

The measurement of the field characteristics from a High Intensity Focused Ultrasound (HIFU) transducer is indispensable to optimize tissue ablation and minimize collateral damage. The objective of this research was to develop a system and method to measure the field characteristics from the HIFU source. The implementation of this work utilizes a planar scanning technique. A needle hydrophone was used as a measurement tool to scan the entire ultrasound beam on both X and Y axis at the focal plane of the HIFU transducer at two different frequencies (1.52 MHz and 5 MHz). The voltage signal representing the acoustic pressure-time waveform was then measured as a function of the hydrophone position in the ultrasound field. The pressure distributions of the HIFU source such as contour plots, corresponding color plots and threedimensional reconstruction plots were obtained. The relationships between the pressure amplitudes generated from the HIFU transducer and the excitation voltages driving the HIFU source are presented to verify the HIFU field extrapolation assumption. The results show that the system and method to measure the field characteristics from HIFU transducer were successfully developed using planar scanning technique. In addition, the results indicate that the acoustic output is not proportional to the excitation voltage driving the HIFU source.

Session: D2R3ML-Biomedical Instrumetation II

1570017943: Design and construction of Infusion Device Analyzer

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Keywords:

Infusion device analyzer, Infusion devices;

Abstract:

The purpose of the research aims to design and construction of infusion device analyzer. This research has adopted the principle of the standard calibration curve relationship etween the digital output of the load cell to the volume of the solution at any time, and the pressure acting on the pressure sensor to the digital output of it. The designed and constructed infusion device analyzer was composed of four main parts :1) the control part consisting of micro switches for selecting the operating mode, 2) signal detection part composing of load cells, pressure sensor for measuring the volumetric and flow rate of fluid delivered from infusion devices and occlusion pressure in IV line respectively, 3) the processing part comprising of microcontroller ARM Cortex M3 with C language program and 4) the display part includes touch screen graphic - LCD color and computer interfacing via a USB port to analyze the operation of the infusion devices in the form of Trumpet Curve. The results of functional testing were compared with standard infusion devices analyzer Metron Lagu showed that the average percentage error of flow rate and occlusion pressure were 0.134 percent and 0.132 percent successively. The results of standard calibration of the flow rates by the laboratory of Calibration Services and Environmental Analysis Department, Technology Promotion Association (Thailand – Japan) that has been certified by the international ISO – 17025 shown that the average uncertainty of the 95 percent confidence level and average percentage error were ± 1.5 ml/hr and 1.9 percent respectively. The production cost of the prototype is 15,000 baht

Session: D2R3ML-Biomedical Instrumetation II

1570022481: An EMG Instrument Designed for Bruxism Detection on Masseter Muscle

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Keywords:

sleep bruxism; EMG; EMG device; clenching; grinding;

Abstract:

Sleep bruxism (SB) is one of the unsolved problems in dentistry characterized by grinding or clenching of teeth during sleep. Without exact treatment procedure, dentists attempt to alleviate SB symptoms and prevent worsen problem of teeth. Biofeedback method is recently interested because it can change abnormal activity to normal activity for improving quality of life in patients by generating some stimuli feedback back to patients after abnormal activity which is detected by a device. And that normal activity is permanent over time after removal of the device. The aims of this study are to investigate maximum voluntary contraction (MVC) of masseter muscle, and to design a portable particular purposed electromyography (EMG) device for detection of SB activity. 20 participants with average age 21.5 years old were asked to clenching and grinding their teeth for mimicking SB activity and recorded EMG signal for greater analysis. EMG signal of MVC showed maximum value around 870 mV and had powerful frequency of 100 to 400 Hz. An EMG device was designed to be the first part of biofeedback system which amplifies the signal around 5,000 times ith frequency selection in boundary of 100 to 500 Hz for selecting clenching and grinding signals.

Session: D2R3ML-Biomedical Instrumetation II

1570022505: A Design of Encapsulated - Balloon Type Antenna for Microwave Therapeutic System by using

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Keywords:
finite element analysis, , microwave balloon treatment , coaxial opened-slot antenna;

Abstract:
This research proposes a design of a novel microwave applicator which encapsulated in fluid reservoir for a thermal therapy. Heat generated from microwave energy is applied to cure or to reshape a hollow-tubing shape organ or misshape organ from occlusion or narrowing such as tracheal and benign prostatic hyperplasia. This promising technique provides a shorter treatment time and minimal invasive maneuver. We apply a coaxial microwave antenna which inserted into a small balloon reservoir filling with normal saline. The antenna is designed by using a finite element method (FEM). The characteristic of this

proposed applicator is able to transfer effectively a heating from antenna to saline fluid in a silicone balloon. Our dominant advantage is the living tissue will not be severely burned due to directly contact with microwave antenna. Microwave energy of 2.45 GHz frequency in this simulation is trialed at 30 Watts while a total treatment time is 10 minutes by a pulsation control waveform as 1:10 ratio. A temperature distribution in our balloon is constant spreadly and steadily at 60-70 degree of Celsius during all treatment process which is a prominent point significantly of using a heating from balloon instead of a conventional antenna.

Session: D2R3ML-Biomedical Instrumetation II

1570022523: Smart Digital Podoscope for Foot Deformity Assessment

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Keywords:
Podoscope, Footprint, Flatfoot, Foot deformity, oingrgan Digital Image Processing;

Abstract:

Foot deformity is a common problem among Thai people. It is resulted from various causes. The deformity may lead to pain and discomfort of feet and legs. The foot condition can be evaluated using plantar pressures and foot deformity measures, depending on the therapists. This paper presents a design of digital podoscope, a screening tool for patients with foot deformity. Built on a commercial optical scanners, our design is smaller than the camera based system. The scanned foot image is color-mapped by a software to calculate the foot index. The system was tested with twenty-five participants who have been diagnosed with foot abnormality. The data show a comparable results with the standard method. Our further study is to develop an algorithm for automatically assessing the deformity and calculating the foot index.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Hall I
Session	D2R1AE-Medical Image Processing III
Chair	T. Charoenpong
13:00 - 13:15	1570021251 T. Charoenpong
13:15 - 13:30	1570022309 Somchat Taertulakarn
13:30 - 13:45	1570022635 Suchin Adhan
13:45 - 14:00	1570022677 Ameya Patil
14:00 - 14:15	1570022483 Wimol San-Uml

Session: D2R1AE-Medical Image Processing III

1570021251: Face Shape Classification from 3D Human Data by using SVM

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Keywords:

Ellipsoid Fitting Technique, 3D Human Body, Face Plane;

Abstract:

Face shape is also important information for glasses design companies. In this paper, we proposed a noncontact method to classify the face shape by using Support Vector Machine (SVM) technique. This algorithm consists of three steps: head segmentation, face plane identification, and face shape classification. First, as whole 3D body data is captured and used as input of system, Eigenvector is used to define frontal side. Chin-Neck junction, Ellipsoid Fitting Technique and Mahalanobis distance are combined as a head segmentation algorithm to segment the 3D head. Second, face shape can be observed when projected on a plane. Major axes of ellipsoid are used to define a plane along the head called the face plane. Face shape on the face plane is classified into four classes in third step. To test the performance of the proposed method, ninety subjects are used. SVM is used to classify the face shape into four groups. The four type of the face shape are ellipse shape, long shape, round shape, and square shape. The accuracy rate is 73.68%. The result shows the feasibility of the proposed method. An advantage of this method is that this method is first fully automatic and non-contact face shape classification for whole 3D human body data.

Session: D2R1AE-Medical Image Processing III

1570022309: Gaussian Curvature-based Geometric Invariance for Ear Recognition

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Keywords:
Gaussian Curvature; Geometric Invariant; Ear recognition;

Abstract:
Ear recognition is one of the new patterns of biometrics. In this paper we derive a novel geometric invariance on ear surfaces that it is preserved under affine and weak perspective transformations. Our 3D shape features are based on the Gaussian curvature and Mean curvature. When a surface undergoes an affine transformation, the shape features are the affine transformed shape features of the original surface; they are preserved and hence can be for shape matching. We have tested robustness of the shape feature on the 3D ear data for various linear geometric transformations. The experiment results show that our purposed shape feature is suitable for further application to 3D ear identification because its robustness to geometric transformation.

Session: D2R1AE-Medical Image Processing III

1570022635: Alphabetic Hand Sign Interpretation using Geometric Invariance

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Keywords:
Hand alphabet interpretation; B spline curvature; Feature extraction;

Abstract:
Hand alphabet is an important sign language for disability people for a long time. This communication is also necessary for a normal people to understand the meaning as well. Hand language interpretation by applying a hand image posture classification is an active research theme to solve obstacle. In this research, we propose a promising technique to apply a B spline curvature concept for supporting a triangular-based feature extraction element in a hand interpretation process. Area, inner angle and adjacent area ratio which derived from a curvature reference set are created a feature string for each alphabet posture in the template. By testing with all 24 hand alphabets, our system provides a promising result in identification satisfactorily.

Session: D2R1AE-Medical Image Processing III

1570022677: 3D LOCALIZATION OF CHOROIDAL VESSELS IN OPTICAL COHERENCE TOMOGRAPHY IMAGES OF POSTERIOR VISUAL SECTION USING LEVEL SET METHOD

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Keywords:

Image segmentation, Mutual information, Level set method, Optical coherence tomography (OCT), Choroid, 3D visualization;

Abstract:

Various vision impairments are symptomatized by structural defects in the choroid layer of the posterior visual section. In order to achieve early detection of such diseases, it is desirable to detect anomaly in individual vessels even before such structural changes set in. To this end, we propose a level set method for localizing individual choroidal vessels in 3D through sectional optical coherent tomography (OCT) images using a natural information-theoretic energy functional. We provide results using primary OCT images, and showcase those with an advanced 3D visualization platform based on lightfield technology

Session: D2R1AE-Medical Image Processing III

1570022483 : A Lossless Physical-Layer Encryption Scheme in medical Picture Archiving and Communication Systems using

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Keywords:
Encryption Scheme, Picture Archiving and Communication Systems, Highly-Robust Chaotic Signals;

Abstract:
this paper reviews some major techniques related to the security issues in Picture Archiving and Communications System (PACS) of medical images. Three conventional techniques including watermarking, digital signature and encryptions are studied. The encryption scheme using highly-robust chaotic signals is also proposed as a new lossless physical-layer that improves security in medical images in PACS. The dynamical system utilizing signum function is employed to generate chaotic signals with smooth bifurcation, i.e. no appearance of periodic windows. Nonlinear dynamics of the chaotic maps were initially investigated in terms of Cobweb map, chaotic attractor, Lyapunov exponent spectrum, bifurcation diagram, and 2- dimensional parameter spaces. Encryption qualitative performances are evaluated through pixel density histograms, 2- dimensional power spectral density, key space analysis, key sensitivity, vertical, horizontal, and diagonal correlation plots. Encryption quantitative performances are evaluated through correlation coefficients, NPCR and UACI. Demonstrations of wrong-key decrypted image are also included.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room I
Session	D2R2AE-Medical Signal Processing III
Chair	Surapong Pongyupinpanich
13:00 - 13:15	1570020681 S. Pongyupinpanich
13:15 - 13:30	1570016239 Meng Wang
13:30 - 13:45	1570022177 Thanida Siritan
13:45 - 14:00	1570022253 Tian Swee Tan
14:00 - 14:15	1570023351 Tasawan Puttasakul

Session: D2R2AE-Medical Image Processing III

1570020681 : Feasibility and Conceptual Design of Non-Invasive LF System for Therapeutic Applications

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Keywords: -

Abstract:

Since non-destructive therapeutic methods are taking into account in modern clinical therapy, this paper proposes the design concept of a configurable non-invasive radio frequency (RF) system for treatment applications. The system is designed based on the amplitude shift keying (ASK) technique and resonance RF of a marked cellular organism. At the resonance frequency, self-regulation mechanism of a cell is operated i.e. recovery and reconstruction. Carrier and low frequency are modulated systematically in order to perform particular resonance RF patterns. The modulated frequency is able to configure, to sweep and to radiate via spiral copper antenna in wide frequency spectrum from 0.1 MHz to 50 MHz with adjustable output power from 5-Watt to 50-Watt. Trial experiment with normal cancer cells at 1.52 MHz within 10 minutes reports that the cells are relatively respond to the RF frequency. The vitro testing results report that the generated RF signal effects to the development rate of cancer cells.

Session: D2R2AE-Medical Image Processing III

1570016239: Architectural Hardware Design of Modulator and Demodulator for Galvanic Coupling Intra-Body Communication

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Keywords:
Hardware Design, Intra-body communication (IBC), QPSK, DDS, carrier recovery clock synchronization, FPGA;

Abstract:
In this work, galvanic coupling intra-body communication (IBC) is presented as a promising approach for wireless personal health monitoring system. The architectural hardware design of a QPSK modulated data communication system for galvanic coupling IBC is proposed. The channel characteristics of the human body are first reviewed. Hardware design is performed using VHDL codes and realized in FPGA devices. ModelSim and Quartus II design environment are used for the functional and timing verification. The whole design is efficiently fitted into an Altera Cyclone II 2C35 FPGA chip. The proposed solution has shown its feasibility in the study of galvanic coupling IBC at the physical layer. Moreover, the whole design is flexible

for the functional enhancements such as channel coding and channel equalization in the future research.

Session: D2R2AE-Medical Image Processing III

1570022177: Enhanced Pseudo-Dynamic Receive Beamforming Using Focusing Delay Error Compensation

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Keywords:
beamforming; FPGA; dynamic receive beamforming; ultrasound imaging system;

Abstract:

Dynamic receive beamforming updates focusing delays for every samples of a scanline, leading to increased hardware complexity. To reduce this, pseudo-dynamic receive beamforming is applied to divide scanlines into windows and each window shares the same focusing delays. However, only one sample in a window is in focus, while the rest are out of focus. This paper presents a method to enhance pseudo-dynamic receive beamforming by using linear least squares approximation of the focusing delay errors for every sample in a window in order to compensate for the delay errors of the out-of-focus samples. The method is preliminarily implemented on a single fieldprogrammable gate array (FPGA) with 500K gates.

Session: D2R2AE-Medical Image Processing III

1570022253: Recognition Test On Highly Newly Robust Malay Corpus Based On Statistical Analysis For Malay Articulation Disorder

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Keywords:

HMM; Articulation Disorder; SLP; Malay Language Vocabulary;

Abstract:

In designing the Malay language database for articulation disorder, the priority is more on Malay alveolar target words where the important set of words had been used for therapy training exercise especially for the patient at Sekolah Kebangsaan Pendidikan Khas (SKPK), Johor Bahru [9]. The use of manual or traditional technique by speech-language pathologist (SLP) at SKPK is not efficient anymore because it can lead to time consuming and require a lot of involvement of SLP for each therapy session for the ratio of 2:1000 of SLP to

patient. Therefore this paper describe the computerized technique that been use in speech recognition where few experiment had been conducted in the process of building the Computer-based Malay Language Articulation Diagnostic System that can be use specifically for speech articulation disorder. The technique use for statistical and processing the word behind this system is Hidden Markov Model (HMM). From the total 108 target words that been collected, few words been selected to run the experiment by using voice sample of real patient. The experiment results shows the accuracy of the recognition rate has achieved about 97% from the overall sample and few words can be claimed as “”major spoken”” mistake that always happen in speech articulation disorder case. The experiment regarding to voice sample evaluation had also been done to find the total accuracy rate for Malay alveolar consonants.

Session: D2R2AE-Medical Image Processing III

1570023351: Feature Extraction of Wavelet Transform Coefficients for sEMG Classification

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Keywords:
Electromyography signal; EMG feature extraction; wavelet transform;

Abstract:
Considering the vast variety of EMG signal applications such as rehabilitation of people suffering from some mobility limitations, scientists have done much research on EMG control system. In this regard, feature extraction of EMG signal has been highly valued as a significant technique to extract the desired information of EMG signal and remove unnecessary parts. This proposed method is based on discrete wavelet transform (DWT). This method consists of 2 main processes; feature extraction and classification. Feature extraction is implemented from the EMG signals, and different level of wavelet decomposition (cA3, cD3, cD2 and cD1) using root mean square (RMS) and cepstrum coefficient (CC) . Then, the feature vector is classified based on decision functions obtained by PCA. Experimental results showed that our method using DWT can improve motion recognition accuracy compared to when using raw EMG signals.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room II
Session	D2R3AE-Biomedical Instrumetation III
Chair	Soochan Kim
13:00 - 13:15	BMEiCON-0004 Soochan Kim
13:15 - 13:30	BMEiCON-0001 K. Kaewkannate
13:30 - 13:45	BMEiCON-0003 Yuttana Pititeeraphap

Session: D2R3AE-Biomedical Instrumetation III

BMEiCON-0004: 3-Axis Static Magnetic Field Cancellation System

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Keywords:

Magnetic field; Geomanetism; Cancellation; Real¬time; Biological effect;

Abstract:

We have been unwittingly exposed to magnetic field. Biological effects due to electro-magnetic field exposure has been studied over the past several decades. There has been epidemiological studies and laboratory studies. In the case of laboratory studies, the effect was observed through the cell stimulation of an artificial magnetic field. The used frequency and waveform are various in the cell experiment, but the intensity of the magnetic field is usually around 10G. Intensity of Earth's magnetic field is about 300-400mG and surrounding electromagnetic fields are various and hard to predict. Although this intensity is not much stronger than artificial magnetic field as 3-4%, but we can't ignore the effect because every living thing on earth has already adapted for long time ago. In this study, we have designed and implemented the 3-axis static magnetic field generator in order to remove the field in the real-time and kept its intensity less than ±5mG(±0.5uT) using 3 axes Helmholtz coil.

Session: D2R3AE-Biomedical Instrumetation III

BMEiCON-0001: Optimal Positions for Foot Pressure Sensors in Walking Analysis

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Keywords:
pressure sensor, optimal sensor position, walking analysis, foot angle measurement area;

Abstract:
We suggest the optimal position of sensors used for measuring foot pressure. Foot pressures were obtained from 11 healthy persons (6 men and 5 women) while they were walking on a treadmill for 1 minute at 3km/h. The order of high correlation coefficients were in: the heel region (r = -0.35 on sensor number 10), the metatarsal region (r = -0.27 on sensor number 79), the toe region (r = -0.19 on sensor number 74) and the barefoot region (r = -0.10 on sensor number 68), respectively. However, the pressure could not show angle information of the foot, even though this is also important for gait diagnosis or daily monitoring. Therefore, we analyzed the foot angle using a 9DOF (6-degree of freedom) IMU sensor. From the results, the highest negative pitch angle occurred at the moment of heel strike, while the highest positive pitch angle occurred at the moment of toe roll-off. Thus, both of the foot pressure and the angle information could increase the accuracy and usfulness of walking or gait analysis.

Session: D2R3AE-Biomedical Instrumetation III

BMEiCON-0003: Vital Signs Monitoring System Using FPGAs

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Keywords:
field programmable gate arrays; vital signs; reconfigurable system; very-high-speed integrated circuit HDL

Abstract:
We developed a mobile device using field programmable gate arrays (FPGAs) to detect and monitor basic human body functions, such as, body temperature, blood pressure, heart rate and respiratory rate. This information can give a clue to a possible diagnosis and display a recovering progress in treatment. We designed the digital circuits and electronic components tested and simulated them with using Very-High-Speed Integrated Circuit Hardware Description Language (VHDL). Synthetic circuits were then downloaded into chip on our developed circuit broad and all electronic components were built up together. A low-cost in-house device was completely made as a reconfigurable system. We successfully used our vital signs devices to measure body temperature, blood pressure, pulse rate and respiratory rate. Further development, we will design and customise our existing device to be smaller in its size and much easier to handle.

Technical Program

Thursday, November 27, 2014 (Day-2)

Room	Hall I
Session	D2R1AL-Medical Image Processing IV
Chair	Kazuhiko Hamamoto
14:30 - 14:45	1570022535 B. Sukanan
14:45 - 15:00	1570022557 Sorawit Fong-in
15:00 - 15:15	1570022567 V. Pawankiattikun
15:15 - 15:30	1570024333 Dilok Puanhvuan

Session: D2R1AL-Medical Image Processing IV

1570022535: Close-to-Actual Delineation Method in SPECT Images

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Keywords:
SPECT images; phantoms; SPECT volume; digital image processing;

Abstract:
Identifying the border of a human's organ in medical images, especially in SPECT (Single Photon Emission Tomography) images, is a very difficult task due to the high diffusion of radiopharmaceuticals around the boundaries. Many segmentation techniques have been proposed to segment and find the volume of internal organ from SPECT images. Results are usually compared with those from manual segmentation by experts. Nevertheless, experts' manual segmentation results can easily be inaccurate because of the scattered boundar-

ies in the SPECT images. This paper proposes a segmentation method to get close-toactual boundaries in SPECT images. Geometric-shape phantoms are used for verifying the close-to-actual edges via volume calculations. Results from the proposed method are compared with those from manual segmentation method.

Session: D2R1AL-Medical Image Processing IV

1570022557: A Header Encryption of Ultrasound Image using Absolute-Value Chaotic Map

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Keywords:
Partial Encryption Scheme, Absolute-Value Chaotic Map, electronic health records;

Abstract:

this paper presents a partial encryption scheme using absolute-value chaotic map for secure electronic health records (EHR). The HER system has been an emerging technology that allows medical personals to create, manage, and control medical data electronically through specific database or even web browsers. The proposed encryption scheme realizes XOR operations between separated planes of binary gray-scale image and a binaty imgae generated by an absolute-value chaotic map. The proposed is relatively simple containning a single absolute-value function with two constants and offers complex and robust dynamical behaviors in terms of random output values. Experiments have been performed in MATLAB using a magnetic resosnace image which is divided into 64 sub-blocks and 13 th itterations were proceeded for encryption. Encryption qualitative performances are evaluated through pixel density histograms, 2-dimensional power spectral density, and vertical, horizontal, and diagonal correlation plots. For the encryption quantitative measures, correlation coefficients, entropy, NPCR and UACI are realized. Demonstrations of wrong-key decrypted image are also included. The proposed encryption scheme offers a potential alternative to a secure medical data records and web browsing through clound computing systems.

Session: D2R1AL-Medical Image Processing IV

1570022567: A Method for Contact-free Heart Rate Measurement on a Video Sequence Using Simulink

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Keywords: -

Abstract:
This paper presents a method for a contact-free heart rate measurement on a video sequence using Simulink. The heart rate is measured by detecting the prominent frequency of the skin-color change in a human face. As color features in a video sequence, we utilize both green and hue signals. The frequencies of the two color signals are analyzed using multiple observing times. The prominences of the Fourier spectrums of the two color signals at multiple observing times are then evaluated statistically. Finally, the heart rate measurement is conducted based on the most distinct spectrum. Experimental results show that the proposed method can perform heart rate measurement accurately in real time.

Session: D2R1AL-Medical Image Processing IV

1570024333: Automated Navigation System for Eye-Based Wheelchair Controls

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Keywords:
Wheelchair navigation; eye control; disability patient; image processing;

Abstract:

An electric wheelchair is basically acknowledged for mobility improvement in disability patients. In some cases, their hand could not well function. They may tire easy before reaching to the desired destination. Furthermore, the safety is the most concerned issue for wheelchair control in disability patients. Therefore, this work tries to develop the prototype of the automated navigation system that could safely navigate and facilitate comfortable to the disability patients. In the proposed work, the patients could simply control the wheelchair directions (manual control mode) or select just the destination (automatic navigation mode) by using eye-based wheelchair control. The results revealed that 100% accuracy could be achieved in the trained normal subject with approximately 5 seconds of eye calibration time. The user could enter or exit the system by eye closing protocol. The wheelchair could be accurately navigated on the pre-located mapping. In addition, the obstacles could be detected and safely avoided by the developed automated navigation system.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room I
Session	D2R2AL-Other BME Related Fileds
Chair	Tohru Yaki
14:30 - 14:45	1570006635 Tian Swee Tan
14:45 - 15:00	1570014749 Yan-Bo Lin
15:00 - 15:15	1570023725 K. Sampuangthong
15:30 - 15.45	BMEiCON-0002 T. Angsuwatanakul

Session: D2R2AL-Other BME Related Fileds
1570006635: Hybrid Battery for Rapid Charging of Biomedical Application

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Keywords:

Hybrid battery; rapid charging; fast charging; super-capacitor;

Abstract:

Battery is one of the most reliable sources of energy in most of the modern electronic products. In modern medicine, there is a lot of medical devices use battery as their power source. Strangled by the long period of time needed to charge battery is one of the difficulties faced by most of the battery supported biomedical devices. Therefore, we come up with a solution to solve the charging time weakness. By combining the fast charging roperty of supercapacitor and high energy density lithium ion battery, a new hybrid battery is produced. Giving a breakthrough in charging process, this hybrid battery reduced significant amount of time needed during charging without reduces the performance and lifespan of the battery. The energy must be able to withstand for a longer period and the hybrid battery capacity is equivalent to standard lithium ion battery. In the initial 7 minutes charging, hybrid battery charge 3.7 times faster than regular battery. As for fully charge case, hybrid battery saves 21.45 minutes to achieve fully charged status. This hybrid battery has faster charging speed without reducing too much on the energy density compared to the commercial lithium ion battery.

Session: D2R2AL-Other BME Related Fileds

1570014749: Processing and analysis of imbalanced liver cancer patient data by case-based reasoning

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Keywords:
imbalanced dataset; over-sampling; undersampling; liver cancer; case-base reasoning;

Abstract:
The research on clinical data is one of the fastest growing fields all over the world. In general, most of the data have imbalanced issues, which may cause some problems in the researches. In this study, the methods of over-sampling and under-sampling are used for handling the issues of data imbalanced. The case based reasoning (CBR) is used for developing classification models to predict recurrent statuses of patients with liver cancer. Classification results of these two methods are compared with those of an original imbalanced dataset by the standard indicators, such as sensitivity, specificity, balanced accuracy (BAC),

positive predictive value (PPV), negative predictive value (NPV), and accuracy. According to the preliminary results of classification methods, on average, the BAC of balanced methods of the under-sampling (66.07%) and the over-sampling (54.24%) exert a significant improvement compared with the imbalanced grouping dataset (48.33%). Most importantly, the under-sampling method could acquire the highest mean accuracy of the three datasets (under-sampling: 66.76%, over-sampling: 53.47%, imbalanced: 48.58%). In undersampling method, mean PPV, NPV, and accuracy are higher than 65% (PPV: 65.44%, NPV: 69.44%, accuracy: 66.76%). The balanced datasets can provide benefits for classification models and efficiently reduce biased interpretations.

Session: D2R2AL-Other BME Related Fileds

1570023725: Evaluation Levels of Water Quality in Maeklong Basin Using Fuzzy Logic

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Keywords:
water quality; fuzzy logic; evaluation levels of water quality;

Abstract:
This the paper presents a model to create rule in order to divide criterion of water quality from 5 indices follows: BOD, DO, FCB, TCB and NH3 which are divided to criterion of 4 levels i.e. good, medium, bad and very bad. The data sets collected from the Maeklong basin rom 9 provinces in Thailand are used more than 200 sets from 41 sampling stations. In the present study, a methodology based on fuzzy logic to assess water quality is proposed. The result from fuzzy logic is that an accuracy is approximately at 89.42%. Therefore, fuzzy logic is a suitable to use a development of effective water management plans.

Session: D2R2AL-Other BME Related Fileds

BMEiCON-0002: Multi-Scale Sample Entropy as a Feature for Working Memory Study

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Keywords:
neuroimaging; neuroinformatics; electroencephalography (EEG); multi-scale sample entropy (MSE); working memory;

Abstract:
Toward the understanding of how human brains work so that we could manage to effectively improve the conditions of neurological disorders or even enhance the cognitive performance, working memory study is of interest. Multi-scale sample entropy has been used to analyze the complexity of biomedical data. This study aims to investigate the potential of using multi-scale sample entropy as a feature for characterizing memory. We applied complexity analysis on EEG data recorded during a cognitive experiment targeting working memory through visual stimuli. The results revealed the distinctive sample entropy for various memory cases in prefrontal area. This indicated the potential of using multi-scale sample entropy for characterizing memory.

Technical Program

Thursday, November 27, 2014 (Day-2)	
Room	Conference Room II
Session	D2R3AL-Biomedical Instrumetation IV
Chair	Kenji Yamada
14:30 - 14:45	1570022161 A. Wongkamhang
14:45 - 15:00	1570022565 B. Banik Pathik
15:00 - 15:15	1570022969 Yunyong Punsawad
15:15 - 15:30	1570022489 Hussein Alnassan

Session: D2R3AL-Biomedical Instrumetation IV

1570022161: Development of The Low – Cost Blood Pressure Simulator

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Keywords:
Automated Sphygmomanometer, Blood Pressure, Blood Pressure Simulator;

Abstract:
The objective of this research was to develop the low – cost blood pressure simulator for verifying of oscillometric automated sphygmomanometer in Thailand and compared this simulator with commercial simulator Fluke Cufflink. The testing results of the precision and the accuracy of pressure generation showed that the average percentage error and

percentage precision were 0.5 % and 100 % successively. Finally, oscillometric BP devices (6 models from 5 manufacturers) were tested for checking the performance of the simulator. The results of the performance testing showed that the percentage error and precision were o1 % and 99 % sequentially. We expected to continue to improve for the better quality and will be commercialized to be used to verify the automated sphygmomanometer in Thailand afterwards.

Session: D2R3AL-Biomedical Instrumetation IV

1570022565: Design, Simulation and Implementation of a Novel Online Patients' Health Checking Method for Physicians

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Keywords:
Health monitoring system, Pulse sensor, Temperature sensor, Wireless data transfer;

Abstract:

This article is about monitoring patients health, where patient's physical information i.e. body temperature and pulse rate have been measured which will automatically be updated to online for the help of those who lives distant places and wants to know the condition of their physician. In this project, firstly the temperature and pulse-rate data have been taken from the patient and fed for processing to a microcontroller. Then the processed ata have been sent to LCD display, where the real data has been viewed for the first time. After that the data has been send to computer through RF (Radio Frequency) module. Next the data has been converted by RS232 to USB converter and decoded by "mikroC" software. At last the decoded data which is patient temperature and pulse-rate data from the device have been updated to online automatically. This facility would help the relatives' as well as the doctors' to monitor the patients' condition from anywhere. In this project the research on the design of a health monitoring system to support patients. The focus has been on the automatic data reading of their temperature and pulse rate and then transfer the reading online through internet so that the patient's physician and relatives can check it. The data will be updated in the interval of 15 seconds. A software platform was built to handle these data from the experiments.

Session: D2R3AL-Biomedical Instrumetation IV

1570022969: EEG-based BCI System via Arithmetic and Emotional Imagery

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Keywords:
Emotional Imagery, Electroencephalography EEG, Brain Computer Interface BCI;

Abstract:
Nowadays, the number of severe disabled (a totally dependent or assisted living) is dramatically increased due to the increasing rates of accident and brain disease. Therefore, this paper proposes a novel modality of brain-computer interface (BCI) system as an alternative assistive tool for the severe disabled. The use of EEG based emotional and arithmetic imagery from the pre-frontal area is employed. Linear discriminant analysis (LDA) is used to classify emotional and arithmetic imagery by using spontaneous EEG. The comparison between linear and quadric functions of LDA classifier isproposed. The results of the proposed BCI modality as well as its processing algorithm as LDA with quadric can achieve 86% accuracy function. Hence, this system can be one of the potential assistive tools for the serve disabled in their daily activities.

Session: D2R3AL-Biomedical Instrumetation IV

1570022489: Modified Dipole Antenna For Directional Microwave Ablation Using 3D Numerical Simulation

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Keywords:
Microwave ablation, liver tumors, targeted directional radiation;

Abstract:
Microwave ablation has several medical applications including liver, kidney, bone and lung. Numerical simulation of microwave ablation is a step in the implementation of system design. This paper presents the temperature distribution of targeted radiation dipole antenna for microwave ablation at 2.45GHz. This experiment through the temperature profile around the antenna achieves in the range 50W, 60W and 70W. In addition, we set the ablation time in the range 300s,600s and 900s. The goal of this work is to develop a device for directional tumor ablation avoiding destruction of neural structures.