# 2017 KITAKYUSHU, JAPAN CONFERENCE ABSTRACT

August 23-25, 2017

# Kyushu Institute of Technology, Graduate School of Engineering (Tobata Campus), Japan



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# Welcome Address

On behalf of the organizing committee, I would like to express my sincere thanks to all of you for participating in 2017 2nd International Conference on Biomedical Signal and Image Processing (ICBIP 2017) and 2017 5th International Conference on Biological and Medical Sciences (ICBMS 2017) which will be held in Kitakyushu, Japan during August 23-25, 2017.

Kitakyushu city is one of the famous and historical cities in Japan. It is located northernmost city in Kyushu island and famous as an international city with a million people. In industrial aspect especially iron and steel works in 1901, the Kitakyushu city had played a significant role in Japan. Today, Kitakyushu city reborn as a new city and become a frontier city in green environment and waterfront. I hope that all of the participants can enjoy our historical building including Kokura castle (Japanese traditional castle), retro building (Mojiko Retro District), taking a delicious food, night viewing from the top of the mountain (Mt. Sarakura), Kitakyushu Museum of Natural History and so on.

Through this conference, we hope we could engage with all of the participants in a constructive discussion on related conference topics and exchange ideas. ICBIP 2017 covers a wide range of fields including audio and acoustic signal processing, machine learning for signal processing, image and multidimensional signal processing, and pattern recognition in biomedical applications and so on. On the other hand, ICBMS 2017 also covers a wide range of fields including biomedical engineering, bioinformatics and computational biology, and other related topics such as biometric, biomechanics, and biological sciences and so on.

I believe that both conferences will provided a timely arena where the researchers from many countries present and discuss their recent and development results in all aspects of advanced technology. Also I hope that the conference provides good chances to promote international friendship among the researchers in this field and continues to do so for years to come.

We sincerely hope that all the participants can benefit and have good time at ICBIP 2017 and ICBMS 2017 in Kitakyushu, Japan and greatly appreciated if you attend the next meeting.

Prof. Hyoungseop Kim

Signature

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Conference Chair

# **2017 Kitakyushu Conference Introduction**

#### 2017 5th International Conference on Biological and Medical Sciences (ICBMS 2017)



Papers will be published in following journal:

**International Journal of Pharma Medicine and Biological Sciences (IJPMBS, ISSN: 2278-5221).** which will be included in the Engineering & Technology Digital Library, and indexed by Embase (Under elsevier), ProQuest, Google Scholar, Chemical Abstracts Services (CAS), Indian Science, ICMJE(International Committee Medical Journal Editors), HINARI(World Health Organization), and NYU(Health Sciences Library).

Conference website and email: http://www.icbms.org/; icbms@cbees.org

#### 2017 2nd International Conference on Biomedical Signal and Image Processing (ICBIP 2017)



Papers will be published in the following Conference Proceedings or journal: International Conference Proceedings Series by ACM, which will be archived in the ACM Digital Library, and indexed by Ei Compendex and submitted to be reviewed by Scopus and Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science);



International Journal of Bioscience, Biochemistry and Bioinformatics (IJBBB, ISSN: 2010-3638), and will be included in the Engineering & Technology Digital Library, and indexed by WorldCat, Google Scholar, Cross ref, ProQuest.

Conference website and email: http://www.icbip.org/; icbip@cbees.net

# **Presentation Instruction**

# **Instructions for Oral Presentations**

# **Devices Provided by the Conference Organizer:**

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader) Digital Projectors and Screen Laser Sticks

# Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

# **Duration of each Presentation (Tentatively):**

Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer

Keynote Speech: about **40** Minutes of Presentation and **10** Minutes of Question and Answer Plenary Speech: about **35** Minutes of Presentation and **5** Minutes of Question and Answer

# **Instructions for Poster Presentation**

# Materials Provided by the Conference Organizer:

The place to put poster

# Materials Provided by the Presenters:

Home-made Posters Maximum poster size is A1 Load Capacity: Holds up to 0.5 kg

# **Best Presentation Award**

One Best Oral Presentation will be selected from each presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on August 24, 2017.

# **Dress code**

Please wear formal clothes or national representative of clothing.

# **Keynote Speaker Introduction**

# **Keynote Speaker**



Prof. Hyoungseop Kim Kyushu Institute of Technology, Japan

Prof. Hyoungseop Kim received his B.A. degree in electrical engineering from Kyushu Institute of Technology in 1994, the Masters and Ph.D. degree from Kyushu Institute of Technology in 1996 and 2001, respectively. He is a professor in the department of control engineering at Kyushu Institute of Technology. His research interests are focused on medical application of image analysis.

# Topic: "Image Registration Techniques and Its Application for Computer Aided Diagnosis in Medical Field"

*Abstract*—For reducing the load to radiologist and improving of detection accuracy, a CAD (Computer Aided Diagnosis) system is expected from medical fields. In the medical image processing fields, many related works are reported to develop the CAD system as helpful technical issues. On the other hand, detection of subtle lesions on CT images is a difficult task for radiologists, because subtle shadows tend to have low contrast, and a large number of CT images be interpreted in a limited time. A temporal subtraction image, which is obtained by subtraction of a previous image from a current one, can be used for enhancing interval changes, such as difference in the size of a tumor, on medical images by removing most of the normal structures. For detection of lesions in chest radiographs, the temporal subtraction technique has been applied successfully to clinical cases. Although the overall performance of the temporal subtraction technique was relatively good, registration errors still remained. In this talk, we propose a new non-rigid image warping technique for accurate registration and subtraction of two thoracic MDCT images.

# **Keynote Speaker**



Prof. Hiroshi Fujita Gifu University, Japan

Prof. Hiroshi Fujita received the B.S. and M.S. degrees in electrical engineering from Gifu University, Japan, in 1976 and 1978, respectively, and Ph.D. degree from Nagoya University in 1983. He became a research associate in 1978 and an associate professor in 1986 at Gifu National College of Technology. He was a visiting researcher at the K. Rossmann Radiologic Image Laboratory, University of Chicago, in 1983-1986. He became an associate professor in 1991 and a professor in 1995 in the Faculty of Engineering, Gifu University. He has been a professor and chair of intelligent image information since 2002 at the Graduate School of Medicine, Gifu University. He is a member of the Society for Medical Image Information (President), the Institute of Electronics, Information and Communication Engineers (Fellow), its Technical Groups on Medical Image (Adviser), the Japan Society for Medical Image Engineering (Director), and some other societies such as IEEE and SPIE. He has been also served as scientific committee or program committee members, such as in International Workshop on Digital Mammography, SPIE Medical Imaging, and Computer Assisted Radiology and Surgery (CARS). He was worked as a General co-chair of Asian Forum on Medical Imaging 2007 held in Cheju National University, Korea, and as a General Chair of International Workshop for Breast Imaging (IWDM2014, Gifu). He has also worked as a Guest Editor-in-Chief in Special Section Editorial Committee for Medical Imaging, issued in April, 2013, from IEICE Society in Japan. His research interests include computer-aided diagnosis system, image analysis and processing, and image evaluation in medicine. He has published over 1000 papers in Journals, Proceedings, Book chapters and Scientific Magazines.

#### Topic: "State-of-the-Art of Computer-Aided Medical Image Diagnosis"

*Abstract*—Computer-aided detection/diagnosis (CAD) has become one of the major research subjects in medical imaging and diagnostic radiology. CAD may be defined as diagnosis made by a physician who takes into account the computer output as a "second opinion". The purpose of CAD is to improve the quality and productivity of physicians in their interpretation of medical images. Some pioneer studies are dated back to the 1960s. In 1988, the first U.S. FDA (Food and Drug Administration) approved commercial CAD system, a film-digitized

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mammography (breast X-ray image) system, was launched by R2 Technologies, Inc. (Hologic at present). The success was quickly repeated by a number of companies. FDA-approved CAD products in the field of breast imaging (mammography, ultrasonography and breast MRI), chest imaging (conventional radiography and CT), and CT colonoscopy can be seen until now. In this presentation, the status of the CAD developments and commercialization is reviewed along with some new CAD technologies including AI (artificial intelligence) and deep learning, and also recent topics and results from a CAD-related project called "Multidisciplinary Computational Anatomy" (http://wiki.tagen-compana.org/mediawiki/index.php/Main\_Page) will be introduced.

# **Keynote Speaker**



Prof. Kiyoshi Hoshino University of Tsukuba, Japan

Prof. Kiyoshi Hoshino received two doctor's degrees; one in Medical Science in 1993, and the other in Engineering in 1996, from the University of Tokyo respectively. From 1993 to 1995, he was an assistant professor at Tokyo Medical and Dental University School of Medicine. From 1995 to 2002, he was an associate professor at University of the Ryukyus. From 2002, he was an associate professor at the Biological Cybernetics Lab of University of Tsukuba. He is now a professor. From 1998 to 2001, he was jointly appointed as a senior researcher of the PRESTO "Information and Human Activity" project of the Japan Science and Technology Agency (JST). From 2002 to 2005, he was a project leader of a SORST project of JST. His research interests include biomedical measurement and modelling, medical engineering, motion capture, computer vision, and humanoid robot design.

#### Topic: "Measurement of Rotational Eye Movements in the Dark Environment"

*Abstract*—Car sickness, visually-induced motion sickness (VIMS), stereoimage-induced sickness and their accompanying dizziness and sickness feeling are associated with rotational eye movement. This presentation therefore introduces the method for measuring rotational eye movement at a high speed and with a high accuracy, especially in the dark environment. The author first focuses on the blood vessel image of the sclera (white of the eyeball) which is not affected by the variation of the diameter of the pupil, and second uses weak blue light irradiation in addition to infrared light to enhance contrast on the blood vessel images. The system proposed traces the images. The experimental evaluation shows that rotational eye movement is measured at a processing speed of 78 fps with the average of estimated accuracy of equal to lower than 0.24 degrees in the dark environment where the diameter of the pupil varies differently depending on changes in the ambient environment of lighting and/or image contents observed. No user bothers the blue light irradiation to his/her eyeballs.

# **Keynote Speaker**



Prof. Hiroyuki Kurata Kyushu Institute of Technology, Japan

1988: Graduated from Department of Chemical Engineering, The University of Tokyo 1993: Received Ph.D. from Department of Chemical Engineering, The University of Tokyo 1993-2000: Assistant Professor of Department of Chemical Engineering, The University of Tokyo

1994-1996: Research fellow of Japan Society for the Promotion of Science, Department of Plant Pathology, University of California, Davis

1996: Award for Young Investigators from the Society of Chemical Engineers, Japan

2000-2006: Associate Professor, Kyushu Institute of Technology

2006-present: Professor, Department of Bioscience and Bioinformatics, Kyushu Institute of Technology

2012-present: Director of the Biomedical Informatics R&D Center (BMIRC).

Research and Education Field: Bioinformatics, Systems Biology, Synthetic Biology, Design Thinking for Biomedical Innovation and Entrepreneurship.

# Topic: "A Large-Scale Dynamic Model of Central Carbon Metabolism for Rational Design of Cell Factories"

*Abstract*—A kinetic model provides insights into the dynamic response of biological systems and predicts how their complex metabolic and gene regulatory networks generate biological functions. Biochemical networks within a cell have been modeled extensively at the molecular interaction level. We proposed a powerful methodology of how a large-scale complex biochemical networks are modeled for rational design of cell factories and for understanding of their design principles.

# **Plenary Speaker**



Prof. Hidetaka Arimura Kyushu University, Japan

Prof. Hidetaka Arimura received a BS in 1989 and an MS in 1991 in electronics and information engineering, and his PhD in engineering from Kyoto Institute of Technology in 1996. He used to work for Shimadzu Corporation from 1991 to 1996, Tokyo Women's Medical University from 1996 to 1998, Hiroshima International University from 1998 to 2002, and the University of Chicago from 2002 to 2004. He is currently working as a professor in Division of Quantum Radiation Science, Department of Health Sciences, Faculty of Medical Sciences, Kyushu University, and also he is a certificated medical physicist in Japan. His research interests include computer-aided diagnosis and image assisted radiation therapy based on medical image analysis and pattern recognition. Recently, he published "Image-Based Computer-Assisted Radiation Therapy" (Springer, 2017) as an editor.

#### Topic: "Physics-based Radiotherapy to Radiomics-based Radiotherapy"

*Abstract*—Major requirements in conventional radiation therapy from a physics point of view are: (1) high conformity and homogeneity of the dose distributions to the tumor regions, and (2) accurate tumor localization and patient positioning. On the other hand, from global point of view, medicine is moving toward "precision medicine (PM)," which is a novel concept for disease treatment and prevention that takes into account individual variability (patient or tumor heterogeneity) in environment, lifestyle and genes for each person. However, the issues in PM are invasive biopsy, high cost and slow throughput for examination of gene mutations. Further, since tumors are heterogeneous, a small part of a tumor obtained by a biopsy could not be reliable for PM, and thus it could be difficult to incorporate PM into the radiation therapy. Therefore, radiomics concept has emerged in this field for practically performing PM. The radiomics is the novel field, which massively and comprehensively analyzes a large number of medical images, and extracts mineable data that can make it possible to carry out PM. In the lecture, the author will describe the background and basic concept of the radiomics and its applications including achievements in the author's laboratory.

# **Plenary Speaker**



Dr. Guangxu Li Tianjin Polytechnic University, China

Dr. Guangxu Li received his B.E. and M.E. degrees in automation engineering from Liaoning University of Technology in 2006 and 2009, the Ph.D. degree from Kyushu Institute of Technology in 2013, respectively. He is a lecturer in the school of electronics and information engineering at Tianjin Polytechnic University. His research interests are focused on medical image processing and image-guided surgical system.

#### Topic: "Fractional Statistical Shape Model Method for Multiple Organs Segmentation"

*Abstract*—Due to utilizing the priori information of shapes, Statistical Shaped Model (SSM) methods are concise, yet powerful tools for image segmentation, analyzing and interpreting anatomical objects from medical datasets in Computer Aided Diagnosis (CAD) system. Many objects of interest in images can be represented as deformed versions of some average structure. The talk will include an short overview of model building and automated segmentation pipeline based on SSMs. I will also discuss our recent work to Fractional Statistical Shape Model (FSSM), which aims to build statistical models of the ambiguous boundaries between organs in medical images. We will start from the construction of mesh-based FSSM, especially the registration method of fractional surfaces, up to the segmentation strategy for multiple structures.

# **Brief Schedule for Conference**

		August 23, 201	17 (Wednesday)
	Venue: Lobby in front of C-1C		
	Arrival Regi	stration	10:00~17:00
		Afternoon	Conference
		Venue: Re	oom C-1C
Day 1	13:30~13:35	Opening Rema	arks (Prof. Hyoungseop Kim)
	13:35~14:25	Keynote Speed	ch I (Prof. Hyoungseop Kim)
	14:25~15:15	Keynote Speec	ch II (Prof. Kiyoshi Hoshino)
	15:15~15:40	Coffee Break &	& Group Photo Taking
	15:40~16:20	Plenary Speech	h I (Prof. Hidetaka Arimura)
	16:20~17:00	Plenary Speech	h II (Dr. Guangxu Li)
	August 24, 2	2017 (Thursday	y) 08:30 ~17:50
		Morning (	Conference
		Venue: Re	oom C-1C
	08:30~08:35	Opening Rema	arks (Prof. Hiroyuki Kurata)
	08:35~09:25	Keynote Speed	ch III (Prof. Hiroyuki Kurata)
	09:25~10:15 Keynote Speech IV (Prof. Hiroshi Fujita)		ch IV (Prof. Hiroshi Fujita)
	10:15~10:40 Coffee Break & Group Photo Taking		
	Session 1: 10:40-11:55		
	5 presentations-To	pic: "Biologica	al Signal Analysis and Processing"
	Lunch 12:0	00~13:30	Venue: Room C-1C
	Afternoon Conference		
Day 2	Section 2: 12:20	15.15	Session 3: 13:30~15:15
	Session 2: 13:30~15:15		Venue: Room C-1D
	7 presentations Topic: "Medicinal		7 presentations-Topic: "Biomedical and
	Chemistry and Bioint	formatics"	Rehabilitation Engineering & Medical
			Electronics"
	Coffee Break: 15:15~15:50		
	Session 4: 15:50~17:50		Session 5: 15:50~17:35
	Venue: Room C-1C Venue: Room		Venue: Room C-1D
	8 presentations-Topic: "Biological 7 presentations-Topic: "Medic		7 presentations-Topic: "Medical
	Signal Processing and Tumor Therapy"         Imaging Systems and Techniques"		
		I J	inaging Systems and Techniques
	Poster Sess	sion: 08:30~17:	50         Venue: Room C-1C
	Poster Sess Dinner 18:30	sion: 08:30~17:: Venue: Masu-n	50 Venue: Room C-1C nasa(增正)I'm Kokura(小倉)
	Poster Sess Dinner 18:30 August 25	sion: 08:30~17:: Venue: Masu-n 5 <mark>, 2017 (Friday</mark>	50       Venue: Room C-1C         nasa (增正) I'm Kokura (小倉)         )       9:30~17:30
	Poster Sess Dinner 18:30 August 25	sion: 08:30~17:: Venue: Masu-n 5 <mark>, 2017 (Friday</mark> One Day Vi	1       Inlaging Systems and Techniques         50       Venue: Room C-1C         nasa (增正) I'm Kokura (小倉)         ()       9:30~17:30         isit and Tour
	Poster Sess Dinner 18:30 August 25 09:30~10:00	sion: 08:30~17:: Venue: Masu-n 5, 2017 (Friday One Day Vi Departure fron	1 Inlaging Systems and Techniques 50 Venue: Room C-1C nasa(增正)I'm Kokura(小倉) 7) 9:30~17:30 isit and Tour n KIT to La SEINE
Dev 3	Poster Sess Dinner 18:30 August 25 09:30~10:00 10:00~11:30	sion: 08:30~17:: Venue: Masu-n 5, 2017 (Friday One Day Vi Departure from Visit La SEINE	1 Inlaging Systems and Techniques 50 Venue: Room C-1C nasa (増正) I'm Kokura (小倉) 7) 9:30~17:30 isit and Tour n KIT to La SEINE E
Day 3	Poster Sess Dinner 18:30 August 25 09:30~10:00 10:00~11:30 11:30~12:30	sion: 08:30~17:: Venue: Masu-n 5, 2017 (Friday One Day Vi Departure from Visit La SEINH Lunch (Lunch	1 Inlaging Systems and Techniques 50 Venue: Room C-1C masa(增正)I'm Kokura(小倉) 7) 9:30~17:30 isit and Tour n KIT to La SEINE E box at KIT)
Day 3	Poster Sess Dinner 18:30 <b>August 25</b> 09:30~10:00 10:00~11:30 11:30~12:30 13:00~15:30	sion: 08:30~17:: Venue: Masu-n 5, 2017 (Friday One Day Vi Departure from Visit La SEINH Lunch (Lunch Tour Kokura C	1 Inlaging Systems and Techniques 50 Venue: Room C-1C masa (増正) I'm Kokura (小倉) 9:30~17:30 isit and Tour n KIT to La SEINE E box at KIT) Castle and Shopping mall River Walk
Day 3	Poster Sess Dinner 18:30 August 25 09:30~10:00 10:00~11:30 11:30~12:30 13:00~15:30 16:00~17:00	sion: 08:30~17:: Venue: Masu-n 5, 2017 (Friday One Day Vi Departure from Visit La SEINE Lunch (Lunch Tour Kokura C Visit TOTO M	1 Inlaging Systems and Techniques 50 Venue: Room C-1C masa(增正)I'm Kokura(小倉) 7) 9:30~17:30 isit and Tour In KIT to La SEINE E box at KIT) Castle and Shopping mall River Walk luseum

# **Detailed Schedule for Conference**

# August 23, 2017 (Wednesday)

# Venue: Room C-1C

10:00~17:00	Arrival and Registration	
13:30~13:35	Opening Remarks           Prof. Hyoungseop Kim           Kyushu Institute of Technology, Japan	
13:35~14:25	Keynote Speech I           Prof. Hyoungseop Kim           Kyushu Institute of Technology, Japan           Topic: "Image Registration Techniques and Its Application for           Computer Aided Diagnosis in Medical Field"	
14:25~15:15	Keynote Speech II         Prof. Kiyoshi Hoshino         University of Tsukuba, Japan         Topic: "Measurement of Rotational Eye Movements in the Dark         Environment"	
15:40~16:20	Plenary Speech I Prof. Hidetaka Arimura Kyushu University, Japan Topic: "Physics-based Radiotherapy to Radiomics-based Radiotherapy"	
16:20~17:00	Plenary Speech II Dr. Guangxu Li Tianjin Polytechnic University, China Topic: "Fractional Statistical Shape Model Method for Multiple Organs Segmentation"	

# Venue: Room C-1C

08:30~12:00	<b>Opening Ceremony, Keynote Speech and Session 1</b>	
08:30~08:35	Opening Remarks           Prof. Hiroyuki Kurata           Kyushu Institute of Technology, Japan	
08:35-09:25	Keynote Speech III           Prof. Hiroyuki Kurata           Kyushu Institute of Technology, Japan           Topic: "A Large-Scale Dynamic Model of Central Carbon           Metabolism for Rational Design of Cell Factorie"	
09:25-10:15	Keynote Speech IV           Prof. Hiroshi Fujita           Gifu University, Japan           Topic: "State-of-the-Art of Computer-Aided Medical Image           Diagnosis"	

Note: (1) The registration can also be done at any time during the conference.

(2) The organizer doesn't provide accommodation, and we suggest you make an early reservation.(3) One Best Oral Presentation will be selected from each oral presentation session, and the

Certificate for Best Oral Presentation will be awarded at the end of each session on August 24, 2017.



# Let's move to the session!

# Session 1

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

August 24, 2017 (Thursday)

Time: 10:40~11:55

Venue: Room C-1C

**Session 1: 5 presentations** 

#### **Topic: "Medical Image Recognition and Processing"**

# Session Chair: Prof. Hiroshi Fujita

P0005 Presentation 1 (10:40~10:55)

Statistical Shape Model Generation Using Diffeomorphic Surface Registration

Jiaqi Wu, Guangxu Li, Zhitao Xiao, Huimin Lu, Hyoung Seop Kim and Philip O. Ogunbona

Tianjin Polytechnic University, China

*Abstract*—Statistical shape modelling is an efficient and robust method for medical image segmentation in computer-aided diagnosis. The key step in building a statistical shape model is to find corresponding landmarks in each instance of a training set. In this paper, a novel landmark correspondence estimation method that uses edge collapse surface simplification and the sphere registration is proposed. All the landmarks are selected, transformed by spherical conformal mapping from the instances of the training set and the associated correspondence are automatically found on the spheres. We applied our method on 21 cases of 3-D right lung shapes. The results of image segmentation experiment indicate that our method has a positive influence on the accuracy of segmentation result.

## Time: 10:40~11:55

# Venue: Room C-1C

## **Session 1: 5 presentations**

# **Topic: "Medical Image Recognition and Processing"**

# Session Chair: Prof. Hiroshi Fujita

P0006 Presentation 2 (10:55~11:10)

Comparison of Rotavirus A and Rotavirus D Segment 1 Using Apriori Algorithm, Decision Tree, and Support Vector Machine (SVM)

Yeojin Jung, Yejin Jeong and Taeseon Yoon

Hankuk Academy of Foreign Studies, South Korea

Abstract—Rotaviruses are the viruses that commonly cause gastroenteritis especially among infants and young children worldwide. Symptoms of rotavirus infection include diarrhea, fever, vomiting and dehydration. There are eight species of this virus: A, B, C, D, E, F, G and H. Among them, Rotavirus A is the most common species that cause more than 90% of rotavirus infections in humans whereas Rotavirus D is exclusively found in birds. We harbored suspicion on the factor that causes the difference in infection organisms of two viruses and attempted to compare and contrast segment 1 of Rotavirus A and D for deeper understanding of the specific difference in infection. In this study, we sought for any difference in genome and amino acid sequences between two viruses by applying three kinds of algorithms: Apriori algorithm, Decision Tree, and Support Vector Machine (SVM). Based on the results derived from these algorithms, we concluded that the functional difference in infection originates from the significant distribution of amino acids. Discovery of this relationship between frequencies of amino acids and differences in two viruses and especially characteristics of avian viral infections will contribute to the enhancement of the understanding rotavirus itself, and moreover, development of relevant vaccination for relevant forms of mutation.

#### Time: 10:40~11:55

#### Venue: Room C-1C

#### **Session 1: 5 presentations**

#### **Topic: "Medical Image Recognition and Processing"**

#### Session Chair: Prof. Hiroshi Fujita

P0008 Presentation 3 (11:10~11:25)

Automatic Identification of Circulating Tumor Cells in Fluorescence Microscopy Images Based on ANN

Kouki Tsuji, Huimin Lu, Joo Kooi Tan, Hyoungseop Kim, Kazue Yoneda and Fumihiro Tanaka

Kyushu Institute of Technology, Japan

*Abstract*—Circulating tumor cells (CTCs) are a useful biomarker since they may have some information about cancer metastasis. The blood from cancer patient is analyzed by a fluorescence microscope. It takes a large number of photos for each case, and many cells are contained in the microscopy images. Thus, analyzing them is hard work for pathologists. This work tends to depend on the individual skill of pathologist so misdiagnosis may be happen. In this paper, we develop an automatic CTCs identification method in fluorescence microscopy images based on artificial neural network. We applied our proposed method to 5040 microscopy images (6 cases), and evaluated the effectiveness of our method by using leave-one-out cross validation. We achieve a true positive rate of 98.65 [%] and a false positive rate of 18.24 [%].

#### Time: 10:40~11:55

#### Venue: Room C-1C

#### **Session 1: 5 presentations**

# **Topic: "Medical Image Recognition and Processing"**

#### Session Chair: Prof. Hiroshi Fujita

P1001 Presentation 4 (11:25~11:40)

Pattern Recognition in Thought-Form Images Using Radon Transform and Histograms

Rai Sachindra Prasad, Shishir Prasad and Vikas Prasad

Graphic Era University, India

Abstract—Nature and behavior of human beings are reflected in their Thought-forms which have been shown as inseparable part of human biofield. In scientific experiments so far, only detection and measurement of biophotons has been possible. Experiments have shown the emission of ultraweak biophotons in a spectrum of several colors. The challenges faced in capturing the image of ultraweak photons are today the topic of research for the development of a biophotonic camera. A literature survey on thought form images found a large number of true color images in Theosophical texts published a hundred years ago. Each image was attributed comments of 'Very Good, Good, Bad, or Very Bad, or mix of all' based on the three aspects of Color, Form (Shape), and Outline of the images but without any scientific proof. It was found that there is great deal of similarity of views of Theosophists and Biophysicists on the structural form of human beings. This provided the motivation to analyze the thought form images on the aspect of color using HSV (Hue Saturation Value) space in two recently reported papers. In this paper, the second aspect of shape, has been investigated using Radon Transform and Histograms on a sample of thirty one thought-form images out of several from Theosophical literature. Results show that all images, except one, were classified correctly in the four patterns when compared with the comments in the text.

## Time: 10:40~11:55

# Venue: Room C-1C

## **Session 1: 5 presentations**

# **Topic: "Medical Image Recognition and Processing"**

# Session Chair: Prof. Hiroshi Fujita

P0023 Presentation 5 (11:40~11:55)

Design of Smart Shopping Wall Using Hand Gesture and Facial Image Recognition

Jia-Hong Lee, Mei-Yi Wu, Che-Yu Liu and Yun-Hao Chuang

National Kaohsiung University of Science and Technology, Taiwan

*Abstract*—Rapid technological progress has changed the way of people shopping. Online shopping allows consumers to directly buy products or services over the Internet using a web browser. Mobile commerce makes the online sales transactions happen in anytime and everywhere using wireless electronic devices such as mobile phones or laptops. Mobile shopping in QR code virtual stores is a kind of special shopping experience. Using a camera phone with QR code reader installed, a customer can buy the items displayed on the media by flashing their camera phones on the items and the items would be delivered to them through credit card payment. Many QR code shopping walls were created in Mass Rapid Transit stations, malls or public places in big cities recently.

In this study, we try to construct a smart shopping wall to enhance the fun in QR code shopping experiences. An integrated system was designed to allow customers controlling the showing page of product Ads on the electronic (TV) displays using skeleton-based hand gesture recognition. The system also can estimate the customer's gender and age via facial image recognition with deep learning algorithms. Microsoft Kinect depth sensor was applied in the system and provided a good sensor to catch facial images and skeleton information for the purpose of recognition. Experimental results show that the gender and age classification can achieve high recognition accuracy. Finally, an experimental system is completed based on the proposed framework.

Lunch	
12:00~13:30	Room C-1C

# Session 2

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

August 24, 2017 (Thursday)

Time: 13:30~15:15

Venue: Room C-1C

**Session 2: 7 presentations** 

#### **Topic: "Medicinal Chemistry and Bioinformatics"**

#### Session Chair: Prof. Hiroyuki Kurata

C0005 Presentation 1 (13:30~13:45)

NMD Classifier: A Tool for Systematic Classification of Nonsense-Mediated Decay Events

Min-Kung Hsua, Hsuan-Yu Lin, and Feng-Chi Chen

National Health Research Institute, Taiwan

*Abstract*—Nonsense-mediated decay (NMD) serves to control the quality of mRNAs by degrading the transcripts that could be prematurely truncated. NMD participates in a wide spectrum of biological processes. However, the evolutionary and regulatory origins of NMD-targeted transcripts (NMDTs) have been underexplored, partly because of the complexity in analyzing NMD events. Here we present NMD Classifier, a tool for systematic classification of NMD events for either annotated or *de novo* assembled transcripts. An NMDT was compared against the most similar non-NMDT isoform transcribed from the same gene. The frame-shifting event(s) that led to the NMD event was then identified and classified based on the assumption of minimal evolution/regulation. Our simulation results indicated that NMD Classifier could correctly identify an average of 99.3% of the NMD-causing transcript structural changes, particularly exon inclusions/exclusions and exon boundary alterations. NMD Classifier can be used trace the evolutionary or regulatory trajectory of NMD-causing events in comparative studies, which may lead to discoveries of NMD-mediated phenotypic effects.

#### Time: 13:30~15:15

#### Venue: Room C-1C

#### **Session 2: 7 presentations**

#### **Topic: "Medicinal Chemistry and Bioinformatics"**

#### Session Chair: Prof. Hiroyuki Kurata

C0008 Presentation 2 (13:45~14:00)

Identification and Analysis of Trans-Spliced and Circular RNAs

#### **Trees-Juen Chuang**

Genomics Research Center, Academia Sinica, Taiwan

Abstract—Analysis of high-throughput transcriptome sequencing often detects numerous non-co-linear (NCL) transcripts, which comprised sequence segments that are topologically inconsistent with the reference genome. Post-transcriptional NCL ("PtNCL") events can arise from trans-splicing or back-splicing in cis (or "circular RNA"). Detection of PtNCL transcripts is usually severely hampered by sequence error, alignment error, experimental artifacts, and genetic rearrangements. Firstly, a new tool (NCLscan) was described, which can almost completely eliminate false positives without sacrificing true positives and outperform 18 other publicly-available tools (including fusion- and circular-RNA-detecting tools) in terms of sensitivity and precision. Next, transcriptomics analysis and experimental validations demonstrated that trans-spliced and circular RNAs can share the same non-co-linear junction sites and that some PtNCL events and their splicing type of PtNCL isoforms (i.e., trans-spliced or circular RNAs) were evolutionarily conserved between species. In addition, *trans*-splicing can contribute to pluripotency maintenance of human embryonic stem cells by suppressing lineage-specific gene expression through the recruitment of NANOG and the PRC2 complex factor, SUZ12. The extensive analysis of *trans*-splicing and *cis*-backsplicing in the human transcriptome was also introduced as well. These findings help to facilitate future studies into PtNCL transcripts, opening up this important but understudied class of post-transcriptional events for comprehensive characterization.

#### Time: 13:30~15:15

#### Venue: Room C-1C

#### **Session 2: 7 presentations**

#### **Topic: "Medicinal Chemistry and Bioinformatics"**

#### Session Chair: Prof. Hiroyuki Kurata

C0019 Presentation 3 (14:00~14:15)

Erythrocytes Alterations and Apoptosis in Medaka (Oryzias Latipes) after 4-Nonylphenol Exposure

Alaa El-Din H. Sayed, Chisato Kataoka, Shoji Oda; Shosaku Kashiwada, and Hiroshi Mitani

Assiut University, Egypt

Abstract—The present study has been undertaken to study the dangerous effects of endocrine-disrupting compound; 4-nonylphenol (4-NP) on medaka (Oryzias latipes). Erythrocytes alterations, apoptosis and micronucleated cell frequencies were used for this study as biological indicators. The exposure was given for 15 days using three sublethal concentrations to compare with catfish as animal model. Exposure resulted in increased frequency of alterations, apoptosis and MN in dose-dependent manner. Many morphological alterations and nuclear abnormalities were observed such as acanthocytes, lobed nucleus, eccentric nucleus, fragmented nucleus, blebbed nucleus, bionuclei, deformed nucleus, notched nucleus, hemolyzed cell, crenated cell, tear drop like cells, and schistocyte. Mortality was recorded in 80 and 100  $\mu$ g/l 4-NP indicating that medaka was found to be more sensitive to 4-nonylphenol exposure than catfish. It was concluded that, the 4-nonylphenol caused many malformations in shape and number indicated the genotoxicity in erythrocytes of medaka.

#### Time: 13:30~15:15

#### Venue: Room C-1C

#### **Session 2: 7 presentations**

#### **Topic: "Medicinal Chemistry and Bioinformatics"**

#### Session Chair: Prof. Hiroyuki Kurata

C0018 Presentation 4 (14:15~14:30)

Thermal Damage Modeling Analysis and Validation during Treatment of Tissue Tumors

Mhamed Nour, Aziz Oukaira, Mohammed Bougataya, and Ahmed Lakhssassi

University of Quebec in Outaouais Gatineau, Canada

*Abstract*—The objective of the Laser Interstitial Thermal Therapy (LITT) in treatment is the maximization of the therapeutic effects (tumor tissue laser ablation) with the minimization of any side effects (damage to healthy tissue). The big challenge is the approximation of the tissue tumor topology. While using the MRI stack to capture the 3D tissue tumor topology, we can use a software for conversion to 3d stl file, but the result is always far away from the real topology of the tissue tumor. Mathematical models will help us predict the temperature distribution and tissue damage during the dosimetry planning phase. These models need to be validated with real data in order to be accepted and used by physicians in the dosimetry planning. This paper describes a modeling analysis approach for the prediction of laser ablation volume during the planning phase. We propose three different COMSOL implementations of thermal damage formulation is generated and implemented as a Field-Programmable Gate Array (FPGA). The final product of these implementations is expected to be used by physician as apps during the planning of the dosimetry.

#### Time: 13:30~15:15

#### Venue: Room C-1C

#### **Session 2: 7 presentations**

#### **Topic: "Medicinal Chemistry and Bioinformatics"**

#### Session Chair: Prof. Hiroyuki Kurata

C1003 Presentation 5 (14:30~14:45)

A Natural Product Lucidone Induces Heme Oxygenase-1 Expression against Dengue Virus Replication

Jin-Ching Lee, Wei-Chun Chen, and Chin-Kai Tseng

National Cheng Kung University, Taiwan

Abstract-Dengue virus (DENV) infection causes life-threatening disease by dengue hemorrhagic fever and dengue shock syndrome. Currently, there is no effective therapeutic agent or vaccine against DENV infection, and hence, there is an urgent need to discover anti-DENV agents. The potential therapeutic efficacy of lucidone was first evaluated in vivo using a DENV-infected Institute of Cancer Research (ICR) suckling mice model by monitoring the body weight, clinical score, survival rate, and viral titer. Then, the anti-DENV activity of lucidone was confirmed by Western blotting and quantitative -reverse PCR analysis in a cell-based DENV infectious system. The molecular mechanism of lucidone against DENV replication was clarified by specific RNA silencing and specific inhibitor targeting signaling molecules. Lucidone can effectively protect mice from DENV infection by sustaining survival rate and reducing virus titer in DENV-infected ICR suckling mice. Lucidone inhibited DENV RNA replication, with an EC<sub>50</sub> value of  $25 \pm 3 \mu$ M. Lucidone significantly induced heme oxygenase-1 (HO-1) production against DENV replication by targeting DENV NS2B/3 protease activity, leading to the induction of DENV-suppressed antiviral interferon (IFN) responses. The inhibitory effect of lucidone on DENV replication was attenuated by silencing of HO-1 gene expression or blockage of HO-1 activity, indicating that lucidone-mediated HO-1 induction contributes to its anti-DENV activity. We further found that lucidone-stimulated nuclear factor erythroid 2-related factor 2 (Nrf2) involved in transactivation of HO-1 expression. Lucidone exhibits significant anti-DENV activity in in vivo and in vitro assays. Mechanism investigations revealed that lucidone suppressed DENV replication by inducing Nrf2-mediated HO-1 expression, leading to blockage of viral protease activity to induce anti-viral IFN responses. Lucidone can be considered as a promising candidate for anti-DENV drug development.

## Time: 13:30~15:15

# Venue: Room C-1C

#### **Session 2: 7 presentations**

# **Topic: "Medicinal Chemistry and Bioinformatics"**

# Session Chair: Prof. Hiroyuki Kurata

C1008 Presentation 6 (14:45~15:00)

Fpdhp Induces Anoikis through Down-regulation of Cell Adhesion Molecules and Cell Survival Signals, and Making Cells Susceptible to Apoptosis

Dong Eun Kim, Hyeon Ji Min, Seon Goo Kim, Shin Kim, and Jong Wook Park

Keimyung University School of Medicine, Korea

*Abstract*—Fpdhp, a novel compound produced from terthiopene of Compositae, decreased cell adhesion molecules such as integrin and cadherin and induced massive cell detachment in a dose- and time-dependent manner. It also inhibited phosphorylation of AKT and FAK, which involved in cell survival, and released AIF and cytochrome c to cytoplasm to induce apoptosis. Fpdhp-mediated cell detachment and apoptosis was attenuated by treatment with calpain inhibitor. Fpdhp also decreased expression of molecules associated with anoikis-resistance, such as XIAP, cFLIP, mcl-1, caspase-8, and increased apoptosis-inducing molecules, p53 and bim. When Akt, Mcl-1 and cFlip were over-expressed, Fpdhp-mediated cell detath was decreased. All of these results suggest that Fpdhp works as a strong anokis inducer through down-regulation of cell adhesion molecules, cell survival signals, and molecules associated with anoikis/apoptosis resistance.

## Time: 13:30~15:15

# Venue: Room C-1C

#### **Session 2: 7 presentations**

# **Topic: "Medicinal Chemistry and Bioinformatics"**

# Session Chair: Prof. Hiroyuki Kurata

C1011 Presentation 7 (15:00~15:15)

Sinomenine Attenuates Adjuvant-Induced Arthritis in Rats and Inflammatory Response in Fibroblast-Like Synoviocytes via  $\alpha$ 7nAChR

Lang Yi, Yan-jun Lv, ChongPeng, Hua Zhou, and Yan Dong

Guangzhou University of Chinese Medicine, China

Abstract—Sinomenine (SIN), an alkaloid derived from the plant Sinomenium acutum, has been used for Rheumatoid arthritis treatment in China. Alpha 7 nicotinic acetylcholine receptor ( $\alpha$ 7nAChR,  $\alpha$ 7) is the key receptor of cholinergic anti-inflammatory pathway. It was observed whether the effect of SIN In adjuvant-induced-arthritis (AIA) rats and in fibroblast-like synoviocytes (FLS) could be attenuated by  $\alpha$ -bungarotoxin (BTX), a selective antagonist of  $\alpha$ 7, or by short interference RNA (siRNA) of  $\alpha$ 7. Our results showed that BTX can attenuate the effects of SIN and nicotine (Nic) on arthritis index, hind paw volume, serum tumor necrosis factor  $\alpha$  (TNF- $\alpha$ ) and erythrocyte sedimentation rate (ESR), but not indomethacin (Indo) in AIA rats. SIN inhibition effects on interleukin-6 (IL-6), monocyte chemotactic protein-1 (MCP-1) and vascular endothelial growth factor (VEGF) release were blocked by BTX or  $\alpha$ 7nAChR siRNA. And SIN inhibition effect on NF- $\kappa$ B activation was reversed by  $\alpha$ 7nAChR siRNA. Our results suggest that the selective antagonist of  $\alpha$ 7 or knockdown of  $\alpha$ 7 can inhibit SIN anti-arthritis effect, similar to Nic, but not Indo. SIN inhibits the activation of NF- $\kappa$ B signal pathway via  $\alpha$ 7nAChR in FLS. This study provide evidence that  $\alpha$ 7nAChR is the key target of SIN anti-arthritis effect in AIA rats and in FLS.

# Session 3

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

August 24, 2017 (Thursday)

Time: 13:30~15:15

Venue: Room C-1D

**Session 3: 7 presentations** 

# **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

# Session Chair: To be added

C0017 Presentation 1 (13:30~13:45)

Recognition of Human Hand Activities Based on a Single Wrist IMU Using Recurrent Neural Networks

Patricio Rivera, Edwin Valarezo, Mun-Taek Choi, and Tae-Seong Kim

Kyung Hee University, Korea

*Abstract*—Recognition of hand activities could provide new information towards daily human activity logging and gesture interface applications. However, there is a technical challenge due to delicate hand motions and complex movement contexts. In this work, we proposed hand activity recognition (HAR) based on a single inertial measurement unit (IMU) sensor at one wrist via deep learning recurrent neural network. The proposed HAR works directly with signals from a tri-axial accelerometer, gyroscope, and magnetometer sensors within one IMU. We evaluated the performance of our HAR with a public human hand activity database for six hand activities including Open Door, Close Door, Open Fridge, Close Fridge, Clean Table and Drink from Cup. Our results show an overall recognition accuracy of 80.09% with discrete standard epochs and 74.92% with noise-added epochs. With continuous time series epochs, the accuracy of 71.75% was obtained.

## Time: 13:30~15:15

# Venue: Room C-1D

#### **Session 3: 7 presentations**

# **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

P0001 Presentation 2 (13:45~14:00)

The Research and Development of Wireless Sensing Temperature Measuring System of Human Body

#### Zheng Jian, Chen Zhiyi and Pei Zhongmin

Shanghai Polytechnic University, China

*Abstract*—For the current situation that there is too much aging population and the shortage of medical staffs, the research of wireless sensing temperature measuring system of human body is to meet the demand of social applications. It uses wireless network protocol which is developed independently, researches and develops the equipment that meet the temperature automatic monitoring of mobile group. It also researches the correction of temperature error. It automatically monitors the temperature of mobile group. Test data will be recorded in the database which will be used as a big data analysis of the condition of a person under guardianship and adjust the care plan in time. Wireless sensing temperature measuring system has simple structure, safe use, low cost, high social benefit. For a nursing home or medical institutions of medical staffs, it can reduce labor intensity, improve the work efficiency greatly and it has a certain practical value.

Time: 13:30~15:15

# Venue: Room C-1D

## **Session 3: 7 presentations**

# **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

C0012 Presentation 3 (14:00~14:15)

Myoelectric Analysis for the Fatigue Monitoring of Upper Extremity Robot-Assisted Bilateral Training

Hsiao-Lung Chan, Hao-Wei Chang, Ching-Yi Wu, Ya-Ju Chang, and Szi-Wen Chen

Chang Gung University, Taiwan

*Abstract*—Objective: The objective of this study is to investigate the electromyographic change attributed to muscular fatigue caused by the scale of robot-assisted bilateral arm training (BAT).

Methods: Sixteen healthy subjects were included for both 20-min low-intensity and 10-min high-intensity robot-assisted bimanual exercises on two days with at least 7 days apart. The electromyograms of right upper extremity muscles during exercise were analyzed by the Fourier-based spectral analysis and the median frequency was derived to quantify the spectral shift. The fatigue progression measure (FPM) which quantifies the accumulated spectral shift to lower frequencies in the electromyogram was used to assess the degree of muscular fatigue. Results: Our result demonstrated the FPM index derived from extensor carpiradialis was significant higher after 4 min in high-intensity exercise than that in low-intensity whereas higher FPM was only observed at the 4th min in flexor carpiradialis. The FPM from biceps brachii was also significant after 5 min in high-intensity exercise.

Conclusion: The protocol of robot-assisted BAT should be carefully set to avoid injury. This study demonstrated the higher potential of muscular fatigue in high-intensity exercise can be assessed by the FPM index based on the electromyograms of upper-limb muscles.

## Time: 13:30~15:15

# Venue: Room C-1D

#### **Session 3: 7 presentations**

# **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

C0007 Presentation 4 (14:15~14:30)

Design and Evaluation of the Lower-limb Robotic Orthosis for Gait Rehabilitation Actuated by Pneumatic Artificial Muscle

Quy-Thinh Dao, Moriko Hagiwara, and Shin-ichiroh Yamamoto

Shibaura Institute of Technology, Japan

*Abstract*—In this study, a robotic orthosis for lower-limb rehabilitation training is developed. The robot includes two hip and knee joints. Each joint is actuated by a pneumatic artificial muscle (PAM) in an antagonistic configuration. The bi-articular muscles are used to increase the stiffness of robotic orthosis. The robotic orthosis is evaluated not only by comparing to the normal human walking but also in trajectory tracking control mode. The experiment results show that the angle trajectory of the robotic orthosis is closed to the trajectory of normal human walking and it can also guide the subject to it designated trajectory.

Time: 13:30~15:15

Venue: Room C-1D

#### **Session 3: 7 presentations**

#### **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

C0014 Presentation 5 (14:30~14:45)

Effects of Base Support Changes during Implicit Condition on Standing Postural Strategy

Nur Fatin Fatina bt. Mohd Ramli, Ogawa Sho, and Yamamoto Shin-ichiroh

Shibaura Institute of Technology, Japan

Abstract—Hip and ankle strategies are commonly used in order to maintain and regain balance when people felt the risk of falling, especially in older people. The selection of postural responses was influenced by many factors such as perturbation conditions, experience, adaptation and also fear of falling. Previous studied had reported that the postural coordinate patterns had changed with translation frequency. However, since there is a possibility that the translation surface may be perceived visually and aurally, the changed of inclined surface during dynamic translation perturbation were considered. Thus, the main objective of this paper is to investigate the standing postural strategy during explicit (presence) and implicit (absence) condition of perception sensory at inclined support surface translation with different type of perturbation and sensory sense. Comparison with frequency and postural coordinate patterns under these conditions were observed. Six healthy adults had participated in this experiment study. The subjects were asked to maintain their balance and the standing postural control with and without the presence sensation during inclined support surface translation were observed. The trunk and head were fixed at the fast frequency. Furthermore, muscle activities were active during the implicit condition than the explicit condition. Furthermore, without the visual information, the body intended to sway more and higher activation muscle was observed. This study concluded that the influence from the upper center of the body due to the existences of perception sensory affects the postural control strategy. Besides, the explicit of perception sensory and visual information was important in maintaining our balance. For future investigation, consideration of the existence of perception sensory with translation surface changes is useful for fall prevention.

Time: 13:30~15:15

#### Venue: Room C-1D

#### **Session 3: 7 presentations**

#### **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

C1005 Presentation 6 (14:45~15:00)

The Cortical Mechanism of Dual-Tasking Postural Control in Patients with Hemispheric Stroke

I-Fang Tseng and Jen-Suh Chern

National Taiwan Normal University, Taiwan

Abstract-Objectives: The purpose of this study was to investigate the postural stability and the cortical mechanism in dual-tasking context in patients with stroke at right and left hemisphere. Methods. 11 left and 12 right hemisphere stroke patients and 10 normal, age-matched subjects were recruited. Each subject had to complete an mental rotation task, with online electroencephalogram recording in the three standing postures (feet shoulder-width apart stance, feet together stance, and tandem stance). Center of pressure path length (COPPL), reaction time (RT) and accuracy of mental rotation tasks and event related potentials (ERPs) at frontal-central and parietal cortex were measured. ANOVA was performed. Results: The COPPL in normal subjects were the shortest and the longest in right hemisphere stroke patients (p < .05); it was the shortest under dual-task context and decreased as the mental rotation became difficult. w (p < .05). The P2 peak amplitude at FCz and P4 were the most prominent during dual-task condition and were different among groups (p < .05). Conclusions. Right hemisphere stroke patients was the least stable but their stability improved in dual-task context, especially during difficult cognitive task. Cortical activation in dual-task conditions was prominent and the activation increased with concomitant postural stability enhancement.

## Time: 13:30~15:15

# Venue: Room C-1D

#### **Session 3: 7 presentations**

# **Topic: "Biomedical and Rehabilitation Engineering & Medical Electronics"**

#### Session Chair: To be added

#### C1009 Presentation 7 (15:00~15:15)

Classification of the Gait Behavior Based on Data Obtained from Diverse Patient Populations

#### Nagai Mio

Shibaura Institute of technology, Japan

*Abstract*—In this study, we attempted to classify gait behavior with the use of 133 gait analysis data obtained from diverse of the patient population including young healthy control. In order to characterize gait behavior, selected ten evaluation parameters. Then, we applied a principal component analysis and hierarchical cluster analysis. As the result of cluster analysis, the population could be classified as six subgroups. This classification suitably reflects a severity of the gait disorder and/or an extent of gait stagnation due to their symptom irrespective the type of disease. These results provide a novel insight for the gait classification in a cross-sectoral manner.



# Session 4

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

August 24, 2017 (Thursday)

Time: 15:50~17:50

# Venue: Room C-1C

#### **Session 4: 8 presentations**

# **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

C1004 Presentation 1 (15:50~16:05)

Identification of Myocardial Ischemic and Infarction Episodes Based on ST level and Beat-type Re-attribution Method

#### Woan-Shiuan Chien and Sung-Nien Yu

National Chung Cheng University, Taiwan

*Abstract*—The objective of this study is to establish an efficient and effective recognition system for myocardial ischemic and myocardial infarction episodes in ECG. We first applied a preprocessing algorithm to reduce noise and baseline wander. Then, we simplified the procedures of identifying the important points and defined these points based only on heart rate and the R peak which is relatively unaffected by noise. Thirdly, an ST-deviations-based algorithm was used to identify both myocardial ischemic (MIs) and myocardial infarction (MIn) beats. Finally, a merging algorithm followed by correcting windowing was employed to re-evaluate the attribute of each beat for more accurately identify the beginning and end points of the episodes. The results show that, the proposed method raises the recognition rates from 87.53%, 85.12%, and 80.41%, in identifying MIs, MIn, and normal beats, respectively, to 94.63%, 91.56%, and 92.89%, respectively. The results demonstrate the efficiency and effectiveness of the proposed method in accurately identifying myocardial ischemic and infarction episodes.

Time: 15:50~17:50

Venue: Room C-1C

#### **Session 4: 8 presentations**

# **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

P0012 Presentation 2 (16:05~16:20)

Surface EMG Signal Acquiition Analysis and Classification for the Operation of a Prosthetic Limb

**Kasun Samarawickrama**, Sandun Ranasinghe, Yasoja Wickramasinghe, Wageesha Mallehevidana, Vidarshi Marasinghe and Kanchana Wijesinghe

General Sir John Kotelawala Defence University, Sri Lanka

*Abstract*—Biomedical Signal Processing is one of the key areas in Prosthetics. Electromyogram(EMG) signals are used in Prosthetic designing due to good corporation with biomechanics of human body. The aim of this research is to analyze Surface Electromyogram (SEMG) signal parameters related to upper limb speed and flexion angle for one test subject. SEMG signal acquisition was carried out noninvasively for upper limb elbow flexion with minimal ethical issues. Captured Surface EMG signals were amplified by INA128 amplifier IC and filtered by UAF42 filter IC into 0Hz-500Hz frequency range. Beaglebone Black digital signal processing unit was interfaced with MATLABR2015a Simulink platform for processing of SEMG signals. Offline SEMG signal speed classification was done using Fast Fourier Transformation and Wavelet Transformation along with MATLABR2015a software to classify elbow flexion with respect to speed. Graphical representation of Amplitude variations in each transformation results were able to distinguish the fast elbow flexion and slow elbow flexion. Flexion angle was approximately calculated by goniometer and data were acquired using Arduino ATMEGA 2560 microcontroller. Applying Curve fitting algorithm to correlate SEMG signals with flexion angle will be the future studies. Ultimate goal will be a generalized algorithm for speed classification.

Time: 15:50~17:50

#### Venue: Room C-1C

#### **Session 4: 8 presentations**

# **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

P0014 Presentation 3 (16:20~16:35)

Identification of Sudden Cardiac Arrest (SCA) using Modified Wavelet Transform

Syed Hassaan Ahmed, Nauman Razzaq and Tahir Zaidi

University of WAH, Pakistan

*Abstract*—Electro Cardiogram (ECG) is used to measure and diagnose electrical activity of heart. R peak detection from ECG signal is our main goal. It is the basic mark for identification of different arrhythmias. In this paper, R wave extraction is performed by using Wavelet Transform for the identification of Sudden Cardiac Arrest(SCA). Sudden cardiac death (SCD) is a global health issue. Analysis revealed that millions of people all around the world die as the result of SCD. We need to purpose a suitable and accurate method for its identification. Modified Wavelet Transform method is used for the extraction of R peaks from ECG signal and then RR interval is extracted from ECG signal with the help of MATLAB software to identify SCA. Here a brief comparison is performed to identify SCA patient with Normal Patient. The MIT BIH database has been utilized for evaluating the algorithm.

Time: 15:50~17:50

# Venue: Room C-1C

#### **Session 4: 8 presentations**

# **Topic: "Biological Signal Processing and Tumor Therapy"**

# Session Chair: Prof. Hyoungseop Kim

P0015 Presentation 4 (16:35~16:50)

Association of 24-hour Heart Rate Variability and Daytime Physical Activity: ALLSTAR Big Data Analysis

Junichiro Hayano, Emi Yuda, Yuki Furukawa and Yutaka Yoshida

Nagoya City University, Japan

*Abstract*—This paper reports the temporal structures of the relationships between 24-hour heart rate variability (HRV) and physical activity (PA) in clinical big data of simultaneously recorded electrocardiograms (ECG) and actigraphic data in 21,682 male and 29,446 female patients (age, 20-100 yr). We found that SDNN (standard deviation of 24-hour normal-to-normal R-R interval [NN interval] of ECG) and PA during daytime, evening, and nighttime decreased with age. In regression models adjusted for the effect of age, daytime PA explained 7% of inter-individual variance in SDNN, while evening and early morning PA explained only <0.6% and nighttime PA negatively contributed to SDNN. Daytime but not nighttime PA is positively associated with increased 24-hour HRV.

Time: 15:50~17:50

Venue: Room C-1C

#### **Session 4: 8 presentations**

#### **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

C0015 Presentation 5 (16:50~17:05)

The Effective Procedure of Determining Hotspot for TMS Mapping

Yuko Shimizu, Shin-Ichiro Yamamoto, and Noritaka Kawashima

Shibaura institutes of technology, Japan

*Abstract*—The aim of this study is to search an effective method for identification of hotspot to determine stimulus intensity. Two separated methods utilized for investigating the effective method. First method was a pseudorandom approach delivered stimuli in a pseudorandom manner with using real-time feedback of mapping parameters, which were motor map area and center of gravity (CoG). The second one was a traditional approach, which delivered stimuli along predefined grids. The reproducibility of resting motor threshold (RMT) and CoG position compared with three positions those were the CoG and an estimated peak obtained from the result of mapping in pseudorandom method and traditional hotspot obtained from the traditional method in flexor carpi radialis (FCR). Five volunteers were participated in this study. The result shows there were no differences in reproducibility over the all three positions for both RMT and CoG value, though the average plots shows tendency that the repeatability of the CoG and RMT value were the most stable value determined at the CoG position in pseudorandom manner. This suggests the CoG position in pseudorandom method is the most effective for determining Hotspot, though the participants have to be increased.

Time: 15:50~17:50

Venue: Room C-1C

## **Session 4: 8 presentations**

# **Topic: "Biological Signal Processing and Tumor Therapy"**

# Session Chair: Prof. Hyoungseop Kim

C0002 Presentation 6 (17:05~17:20)

The Resonance Frequency: Effects of Low Intensity Ultrasound on Attached and Floating Cells Viability

Mariantonietta Ivone, Luciano Lamberti, and Carmine Pappalettere

Politecnico di Bari, Italy

*Abstract*—Cancer cell morphological, geometric and mechanic characterization could be important in relationship to therapy modality used. The objective of this work was to analyze the correlation between cell size and low intensity ultrasound sonication frequency for attached and floating cells. MCF7 and U937 cells were stressed by ultrasound in a range between 400 kHz and 620 kHz at 10 Hz PRF (Pulse Repetition Frequency) for three minutes. Immediately after sonication, the vitality and the diameter were evaluated. Although sensitivity to frequency is more evident for attached cells, some effect can be clearly detected also for floating cells: it seems that each fixed frequency prefers to kill floating cell with a particular value of diameter, with a maximum value of killing rate. The results obtained in this research work support the frequency plays a significant role on cell treatment. This result could be interesting not only to explain the proven ultrasound selectivity but also to destroy cancer cells, preserving healthy cells.

#### Time: 15:50~17:50

#### Venue: Room C-1C

#### **Session 4: 8 presentations**

#### **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

C0009 Presentation 7 (17:20~17:35)

Dual-modal CT/Fluorescence Nanoemulsion Platform Composed of Iodinated Oil Injection and Indocyanine Green for Tumor Diagnosis

Haoan Wu and Yu Zhang

Southeast University, China

*Abstract*—Molecular imaging techniques such as magnetic resonance imaging (MRI), X-ray computed tomography (CT) and optical near-infrared fluorescence (NIRF) imaging are more and more important in clinical diagnosis and therapeutics. However, A single imaging modality can't provide comprehensive diagnostic information and meet all requirements in spatial and temporal resolution. Therefore, a powerful way is to combine two or more imaging modalities into single integrated multimodal imaging system. A kind of X-ray computed tomography (CT)/fluorescence dual-modal nanoemulsion probe that combined both CT imaging and near-infrared fluorescent (NIRF) imaging abilities was developed for application in tumor diagnosis. In this study, NIRF molecule indocyanine green (ICG-Der-01) was encapsulated in clinic CT contrast agent of iodinated oil injection based on oil-in-water nanoemulsion platform. In vivo clinical CT and NIRF imaging results suggested the nanoemulsion could accumulate in tumor by the enhanced permeation and retention (EPR) effect and visualize tumor tissues in living body. Due to the excellent drug ability for ICG and iodinated oil we used, the nanoemulsion would have great potential in practical clinical application.

Time: 15:50~17:50

Venue: Room C-1C

#### **Session 4: 8 presentations**

#### **Topic: "Biological Signal Processing and Tumor Therapy"**

#### Session Chair: Prof. Hyoungseop Kim

C0010 Presentation 8 (17: 35~17:50)

Multi-Targeted Magnetic Iron Oxide Nanoparticles for Tumor Hyperthermia

Ling Chen and Yu Zhang

Southeast University, China

Abstract—Magnetic iron oxide nanoparticles were approved as T2 MRI contrast agent for years, while magnetic hyperthermia is another important application. As to increase the amount of iron oxide nanoparticles in tumor region for effective magnetic thermotherapy, specific ligands should be modified on the surface of the nanoparticles for positively targeting to the tumor. The monodispersed Fe<sub>3</sub>O<sub>4</sub> nanoparticles were synthetized by a thermal decomposition method. DSPE-PEG-COOH was used to modify Fe3O4 nanoparticles via rotary evaporation to generate water-soluble nanoparticles called Fe<sub>3</sub>O<sub>4</sub>@PEG-COOH. The performance of Fe<sub>3</sub>O<sub>4</sub>@PEG-COOH was characterized using TEM, DLS, VSM and MRI. The nanoparticles exhibited extremely high relaxation property ( $r_2 = 524$  mM <sup>-1</sup>s<sup>-1</sup>) and saturation magnetization value (Ms = 93 emu/g Fe). In addition, the nanoparticles have superior heating effect under ACMF. RGD and D-glucosamine(GLU) as specific ligands were then coupled to Fe<sub>3</sub>O<sub>4</sub>@PEG-COOH via EDC/NHS. In vitro experiments showed Fe3O4@GLU@RGD could positively target to HUVEC cells which highly express both  $\alpha_v\beta_3$  and glucose transporters (GLUT). These nanoparticles can be used for magnetic resonance molecular imaging and magnetic inductive hyperthermia of tumor.

# Session 5

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

August 24, 2017 (Thursday)

Time: 15:50~17:35

Venue: Room C-1D

**Session 5: 7 presentations** 

#### **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P2001 Presentation 1 (15:50~16:05)

Double-Ring Marker Based 3D Pose Estimation For Rod-Shaped Object From a Single 2D Image

Pin-Hsun Chiu, Day-Fann Shen and Jia-Cyuan Syu

National Yunlin University of Science and Technology, Taiwan

*Abstract*—In this paper, we propose like Double-Ring Marker based method which can estimate the 3D pose parameters of a Rod-shaped object such as MIS (Minimally Invasive Surgery) instrument using just a single 2D image. The core of the proposed method is a set of equations derived from the geometric relationship between the Double-Ring Markers on the rod and their projections onto the image plan through the camera's perspective transformation. Compared to existing MIS pose estimation methods, which normally require time consuming processes including depth estimation, instrument identification and position parameters estimation as the pre-processing, the proposed Double-Rings marker based algorithm is very accurate and efficient.

Time: 15:50~17:35

Venue: Room C-1D

#### **Session 5: 7 presentations**

#### **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0018 Presentation 2 (16:05~16:20)

SAM Filter Based Convolution Neural Network Alogrithm for Leukocyte Classification

Qinming Zhang, Xiyue Hou, Mei Zhou, Song Qiu, Li Sun, Hongying Liu, Qingli Li and Yiting Wang

East China Normal University, China

*Abstract*—In biomedical field, the analysis of red blood cells (RBC) and white blood cells (WBC) were of vital importance for diagnosing diseases. As for WBC, it can be classified into basophils (B), lymphocytes (L), neutrophils (N), monocytes (M), and eosinophils (E) five components. Based on varieties methods of hyperspectral imaging, a novel white blood cell classification method, which was a new implementation algorithm in the field of medical research, was designed by three main blocks: the realization of spectral angle match algorithm, morphological processing method and basic structure of the convolution neural network system. In the case of basophils ,eosinophils, lymphocyte and neutrophils, the classifications accuracies were 95.3%, 93.2%, 90.8%, 92.7% respectively, improved by nearly 10% with respect to the SAM-only cases.

#### Time: 15:50~17:35

#### Venue: Room C-1D

#### **Session 5: 7 presentations**

# **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0020 Presentation 3 (16:20~16:35)

Player Trajectory Reconstruction from Broadcast Basketball Video

Liang-Hua Chen, Hsin-Wen Chang and Hsiang-An Hsiao

Fu Jen University, Taiwan

*Abstract*—To increase the performance of sport team, the tactics analysis of team from game video is essential. Trajectories of the players are the most useful cues in a sport video for tactics analysis. In this paper, we propose a technique to reconstruct the trajectories of players from broadcast basketball videos. We first propose a mo-saic based approach to detect the boundary lines of court. Then, the locations of players are determined by the integration of shape and color visual information. A layered graph is constructed for the detected players, which includes all possible trajectories. A dynamic programming based algorithm is applied to find the trajectory of each player. Finally, the trajectories of players are displayed on a standard basketball court model by a homography transformation. In contrast to related works, our approach exploits more spatio-temporal information in video. Experimental results show that the proposed approach works well and outperforms some existing technique.

#### Time: 15:50~17:35

# Venue: Room C-1D

#### **Session 5: 7 presentations**

# **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0022 Presentation 4 (16:35~16:50)

Multimodal and Multispectral Imaging for Chronic Ulcer Assessment

Wei-Min Liu, Chen-Lin Chen, Li-Yin Chang, Su-Chen Pong, and Hsian-Min Chen

National Chung Cheng University, Taiwan

Abstract—The wound care management is critical for patients with chronic ulcers, and many treatments have been proposed to facilitate the recovery. We propose to use four optical imaging technologies, polarizing visible light, 650nm red light, 940nm near infrared, and 8-12µm long wave thermal infrared imaging, to monitor the ulcer status. Detailed imaging setup is reported and the preliminary results show that several physiological features can be extracted via the multimodal imaging. More clinical data will be collected to establish sufficient statistics to determine the prognostic biomarkers. The goal of such imaging and feature extraction is to indicate whether an ulcer is developing, infected, or recovered before significantly visible change appears.

#### Time: 15:50~17:35

# Venue: Room C-1D

#### **Session 5: 7 presentations**

# **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0003 Presentation 5 (16:50~17:05)

An Interactive Technique of Fast Vertebral Segmentation for Computed Tomography Images with Bone Metastasis

Ran Dong, Huimin Lu, Hyoungseop Kim, Takatoshi Aoki, Yihong Zhao and Youwei Zhao

Kyushu Institute of Technology, Japan

*Abstract*—Computer-aided diagnosis (CAD) system can assistant radiologists to diagnose bone metastasis, which not only reduces burden on workload but also improves diagnostic accuracy. As key step in CAD system, vertebral segmentation can directly affect diagnostic results. In order to obtain high accurate segmentation results, we propose a connected component Labeled Graph Cuts (LGC) algorithm. The proposed method is tested on 100 computed tomography (CT) slices. The assessed quantitatively of experimental results is compared with those by radiologist. The proposed method has a 96.72[%] of True Positive Rate (TPR), and 1.84[%] of False Positive Rate (FPR), which have better performance than conventional Graph Cuts algorithm, 90.07[%] of TPR and 2.32[%] of FPR.

#### Time: 15:50~17:35

#### Venue: Room C-1D

#### **Session 5: 7 presentations**

# **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0027 Presentation 6 (17:05~17:20)

A Low Profile UWB Antenna for Wireless Body Area Network: Design and Analysis

#### Prasanna Venkatesan G K D and Pachiyaannan M

SNS College of Engineering, India

*Abstract*—A low profile nature ultra wide-band (UWB) antenna for wireless body area network (WBAN) is presented in this research work. This antenna can effectively reduce a proximity effect of human body and tri-monopole structure is designed with regular rectangular pattern. The low cost FR-4 epoxy substrate material is constructed along with coaxial feeding achieves the UWB characteristics. This proposed structure produces a bandwidth from 3GHz to 10GHz, which is highly required for higher data transmission for WBAN application. The return loss and VSWR is achieved >-20dB and <2 for the resonant frequencies of 3.1GHz, 5GHz, 8.1GHz and 8.8GHz which is also satisfy the S/C/X band frequencies. This antenna shows that unidirectional radiation pattern with efficiency between 45 to 75% and produce moderate gain of overall bandwidth. These features are highly required and suitable for WBAN communication.

## Time: 15:50~17:35

# Venue: Room C-1D

#### **Session 5: 7 presentations**

# **Topic: "Medical Imaging Systems and Techniques"**

#### Session Chair: To be added

P0026 Presentation 7 (17:20~17:35)

Smart Zoning strategies for Handwritten Tamil Characters in Palm Leaf Manuscripts

**R. S. Sabeenian Sarcius**, P. M. Dinesh Mani, Paramasivam, Adarsh R and Gokul Ravi Kumar

Sona College of Technology, India

*Abstract*—Palm leaf manuscripts has been one of the ancient methods for writing but with time the quality of palm leaf manuscripts degrades and the content needs to be scribed in new set of leaves. In this paper, we have presented an alternate solution to save the Tamil literature contents in palm leaf manuscripts by identifying the handwritten Tamil characters in the manuscripts and storing them digitally. It includes extraction of features like perimeter, Euler number (4, 8), Directional features from uniform zones and Zernike moments by dividing the image into different smart zones. The efficiency for character recognition is calculated by using confusion matrix from classification learner tool.



Dinner	
18:30	Masu-masa(増正)I'm Kokura(小倉)

# **Poster Session**

August 24, 2017 (Thursday)

#### Time: 8:30~17:50

# Venue: Room C-1C

#### **Poster session: 4 presentations**

C1006 Poster 1

Role of N-glycosylation in COX-2 Degradation through the Derin-2/Derlin-1/Caveolin-1/p97 Pathway

Shu-Fen Chen and Song-Kun Shyu

Academia Sinica, Taiwan

Abstract—Derlin-1 and Derlin-2 participate in the endoplasmic reticulum luminal protein retrotranslocation to cytosol for degradation. However, how Derlin-1 and Derlin-2 collaborate to mediate glycosylated protein degradation remains most unknown. Here, we identified that Derlin-2 is the upstream of Derlin-1 in mediating cyclooxygenase-2 (COX-2) degradation that suppression of Derlin-2 upregulated COX-2 level but hindered the interaction of Derlin-1 with COX-2. Also, suppression of Derlin-1 impeded the interaction with Derlin-2 caveolin-1 and p97. Moreover, COX-2 of degradation is N-glycosylation-dependent that blockades of N-glycosylation by mutation or treatment of tunicamycin hindered COX-2 degradation. Intriguingly, interaction of Derlin-2 with COX-2 was COX-2 N-glycosylation-independent, whereas, Derlin-1 and p97 preferred to interact with non-glycosylated COX-2. Additionally, caveolin-1 interacted with COX-2 in an N-glycosylation-dependent manner, whereas, alteration of the N-glycan pattern of COX-2 did not change its interaction with caveolin-1 in CHO-K1 and CHO-Lec1 cells. Collectively, COX-2 degradation is through the Derlin-2/Derlin-1/Cav-1/p97 pathway. N-glycosylation plays differential roles for COX-2 to interact with ERAD factors.

#### Time: 8:30~17:50

#### Venue: Room C-1C

#### **Poster session: 4 presentations**

P0019 Poster 2

Propagation of Alternating Currents on a Rubber Humanoid Phantom Used in an Experiment in the Communications Industry Wrapped with Skin-Imitating Gel Sheets Mixed with a Normal Saline Solution to Determine the Effect of Embedded Electrical Modules

#### Shinji KAWAKURA, Yoshihiro NAKABO, Kiyoshi FUJIWARA

Advanced Industrial Science and Technology (AIST), Japan

Abstract—In recent years, further basic research is required for phantoms with artificial skin and bodily fluid/gelatin mixtures containing normal saline solution (NSS). The phantom used in this study mainly consisted of silicon rubber and had small amounts of other chemical substances. The phantom possessed the stature of an average middle-aged to elderly Japanese man. This humanoid phantom, along with other similar ones, has been used in experiments conducted by the communications industry to measure electromagnetic wave streams and diffusion from common cellular phones. In this work, we measured the propagation and diffusion of alternating currents on and within the phantom over measurement frequencies ranging from 5 Hz to 1 MHz. We also partially wrapped the phantom with skin-imitating gel sheets. Finally, we mixed NSS with the gel sheets, and, by analyzing the data obtained, elucidated the effect of common electric currents from medical machines (e.g., low-frequency therapy equipment) on a common pacemaker and other embedded electrical modules. We suggest practical information and advice for further improvements for the physically challenged and the elderly. Our device holds promise for researchers and developers of phantoms and robots used as virtual physical simulators, which can be combined with existing computational simulation software.

#### Time: 8:30~17:50

#### Venue: Room C-1C

#### **Poster session: 4 presentations**

P0021 Poster 3

Visual Data Analysis Methods Using OpenCV Programs to Evaluate Walking and Falling with a Japanese Walking Support System

#### Shinji KAWAKURA

Advanced Industrial Science and Technology (AIST), Japan

Abstract—In recent years, researchers and engineers have come together to develop diverse, applied, and practical sensing systems to solve the difficulties faced in the development of advanced support systems, technical teaching, and safety issues for physically challenged and elderly people. Following a sequence of studies developing promising systems that address a number of nursing challenges, the purpose of this prospective research was to develop effective systems and demonstrate their accuracy and utility for the aforementioned people. In this kinematic investigation, we develop a physical analysis system, which uses two video cameras to obtain visual data of physically challenged and elderly people from two directions (the subject's front and left). These systems use the OpenCV 2.4.9 package, including the library and header files, and programs originally written in Visual C++. This study examines the qualitative and quantitative characteristics and the unique parameters of (1) the main shaft (the principal axis of inertia) of the subject and the walking support system to highlight the differences between two frames using binary video data, and (2) coordinate values of characteristic points that are set automatically. Finally, we present the output values for the physical measurements obtained from various viewpoints. In future, these methods could be of practical use in providing alternative directions for developers and care managers to assess and treat users' conditions in both outdoor (e.g., playgrounds for the elderly) and indoor settings (e.g., hospitals).

#### Time: 8:30~17:50

#### Venue: Room C-1C

#### **Poster session: 4 presentations**

C0020 Poster 4

Redox Intercalating Probes for Rapid, Sensitive and Quantitative Monitoring of Electrochemical Loop-Mediated Amplification

#### Tsung-Tao Huang, Yu-Hsiang Tang, and Jun-Sheng Wang

National Applied Research Laboratories, Taiwan

Abstract—Genetic detection of pathogens as the point of care testing (POCT) has become increasingly topic in application ranging from food safety, environmental monitoring, homeland security, prenatal diagnosis and detection of infectious diseases. The real-time quantitative electrochemical monitoring of isothermal nucleic acid amplification through loop-mediated amplification (LAMP) is a promising renowned methodology to detect pathogenic DNAs. The real-time quantitative electrochemical monitoring of nucleic acid amplification through loop mediated isothermal amplification (LAMP) are successful gene detection methods for high sensitive detection of pathogenic DNAs. Simple and highly feasible redox compounds, tert-butyl hydroquinone derivative (TBHQ), Celestine blue (CB) and Methylene Blue (MB) have been adopted, characterized and successfully demonstrated in real-time quantitative LAMP. These compounds have shown excellent DNA binding abilities and electrochemical behaviors in both PCR and LAMP buffer. The binding parameters such as binding constant, binding site size and diffusion coefficient were estimated. Besides, CB and MB were highly stable under LAMP thermal conditions and did not inhibit LAMP reaction. Therefore, a real-time quantification of DNA amplification was demonstrated to quantify the initial copy number of target genes on our goldchip based electrochemical nucleic acid detection platform. The real-time detection study has been demonstrated which also verified and authenticated by traditional methods, such as fluoresce and turbidimetric quantitative LAMP.

# **One Day Visit**

August 25, 2017 (Friday) 9:30~17:30

09:30-Gathering at Building NO. 72 in Kyushu Institute of Technology, Japan

# 10:00~11:30-Visit La SEINE (Laboratory of Spacecraft Environment Interaction Engineering)



In December 2004, Kyushu Institute of Technology established La SEINE (Laboratory of Spacecraft Environment Interaction Engineering). At the center, it carried out research and development of space environment technology that is necessary to achieve next-generation space utilization such as small satellites, high-speed broadband communication, high-precision positioning, remote sensing, material creation, sight-seeing, exploration, and energy generation. LaSEINE's mission is to serve humanity by

contributing to development of space activity.

#### 11:30~12:30- Lunch (Lunch box at KIT)

#### 13:00~15:30-Tour Kokura Castle and Shopping mall River Walk



Kokura Castle (小倉城 Kokura-jō) in Kitakyushu, Japan was built by Hosokawa Tadaoki in 1602. It was the property of the Ogasawara clan (from Harima) between 1632 and 1860. The castle was burnt down in 1866 in the war between the Kokura and Chōshū clans. The keep contains a modern folkloric museum and admission is charged to the keep (350 yen), garden (300 yen) and Matsumoto Seicho museum (400

yen). A joint ticket to the three attractions costs 700 yen.

#### 16:00~17:00-Visit TOTO Museum



TOTO Ltd. was founded in 1917. For 100 years since then, TOTO has taken part in Japan's modernization by achieving ideals of its founder to bring a healthy, cultural lifestyle to the Japanese people. To continue to develop in step with society, TOTO believes it is important to retain these founding principles and correctly interpret company history, both of which are critical to pass our corporate

values to future generations. The museum leads visitors through the history of Toto, beginning with the first ceramic flush toilet seat developed in 1914 and the company's formal establishment in 1917 as a pioneer player in the ceramic sanitation industry at a time when most of Japan was still without a sewerage system. Old toilet seats are on display, as well as exquisite porcelain tableware that the company used to produce as a side business in the past.

#### 17:00~17:30-Go back to KIT

# **Conference Venue**

# Kyushu Institute of Technology, Graduate School of Engineering (Tobata Campus), Japan

Kyushu Institute of Technology is one of the 87 national universities in Japan which is located in Fukuoka Prefecture on the island of Kyushu. It is dedicated to education and research in the fields of science and technology. It is often abbreviated to KIT and sometimes to Kyutech. Tobata Campus (Kitakyushu)-Faculty of Engineering, Graduate School of Engineering. It is the oldest campus, opened in 1909. It was designed by Tatsuno Kingo. It originally had three departments: Mining, Metallurgy, and Mechanical Engineering.

You can also get information that how can access Fukuoka Intl. airport to Kitakyushu City from following.



The conference venue is in the 1st floor of Building No. 72 on university map:



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# Feedback Information

(Please fill this form and return it to conference specialist during the conference days.)

<b>Personal Information</b>					
Conference Name and					
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Please indicate your overall satisfaction with this conference with " $$ "					
	Very	Somewhat	Neutral	Somewhat	Very
	Satisfied	Satisfied		Dissatisfied	Dissatisfied
Conference Content					
Presentation and Paper					
Value	-				
Registration Process					
Venue					
Food and Beverage					
Are You A Member of	Yes 🗆	No 🗆			
HKCBEES	(If	"No", you	may app	oly members	ship from
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Do You Willing to Receive	Yes□	No□			
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Would you please specify					
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attending this conference?					
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Would you please list the	
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Other Field of Interest	
Any Other	
Suggestions/Comments	

Thank you for taking time to participate in this conference evaluation. Your comments will enable us to execute future conferences better and tailor them to your needs!