Advanced Program

IEEE
INDONESIA SECTION

ICACSIS 2018

2018 International Conference on Advanced Computer Science and Information Systems

October 27-28 th, 2018
Yogyakarta, Indonesia

UNIVERSITAS INDONESIA
Veritas, Probitas, Iustitia

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FACULTY OF
COMPUTER
SCIENCE

UNIVERSITAS KRISTEN MARANATHA
BANDUNG

FAKULTAS
TEKNOLOGI INFORMASI

CONFERENCE INFORMATION

Dates	October 27th (Saturday) – October 28th (Sunday) 2018
Organizer	Faculty of Computer Science, Universitas Indonesia
	Fakultas Teknologi Informasi, Universitas Kristen Maranatha
Venue	The Phoenix Hotel
	Jl. Jend. Sudirman No.9, Cokrodiningratan
	Kota Yogyakarta, Daerah Istimewa Yogyakarta
	55233, indonesia
	Phone : +62-274- 566617
Official Language	English
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	Kampus UI Depok
	Depok, 16424
	Indonesia
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	W: http://www.cs.ui.ac.id
Conference Website	http://icacsis.cs.ui.ac.id

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VENUE MAP

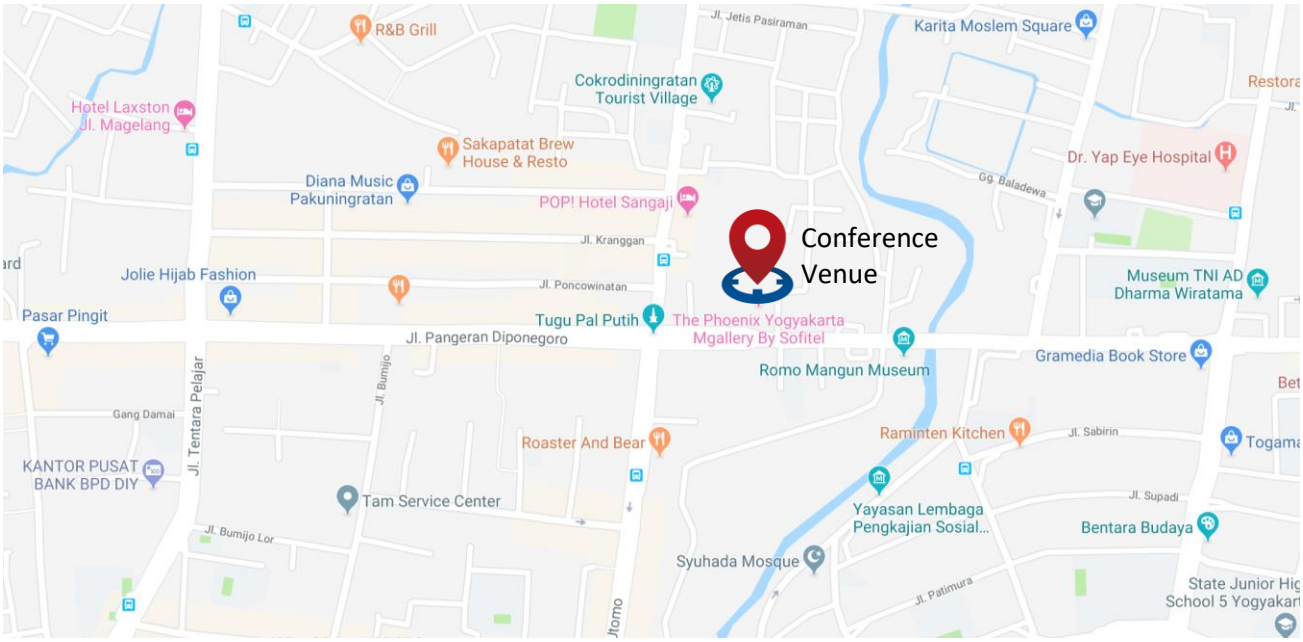
The Phoenix Hotel

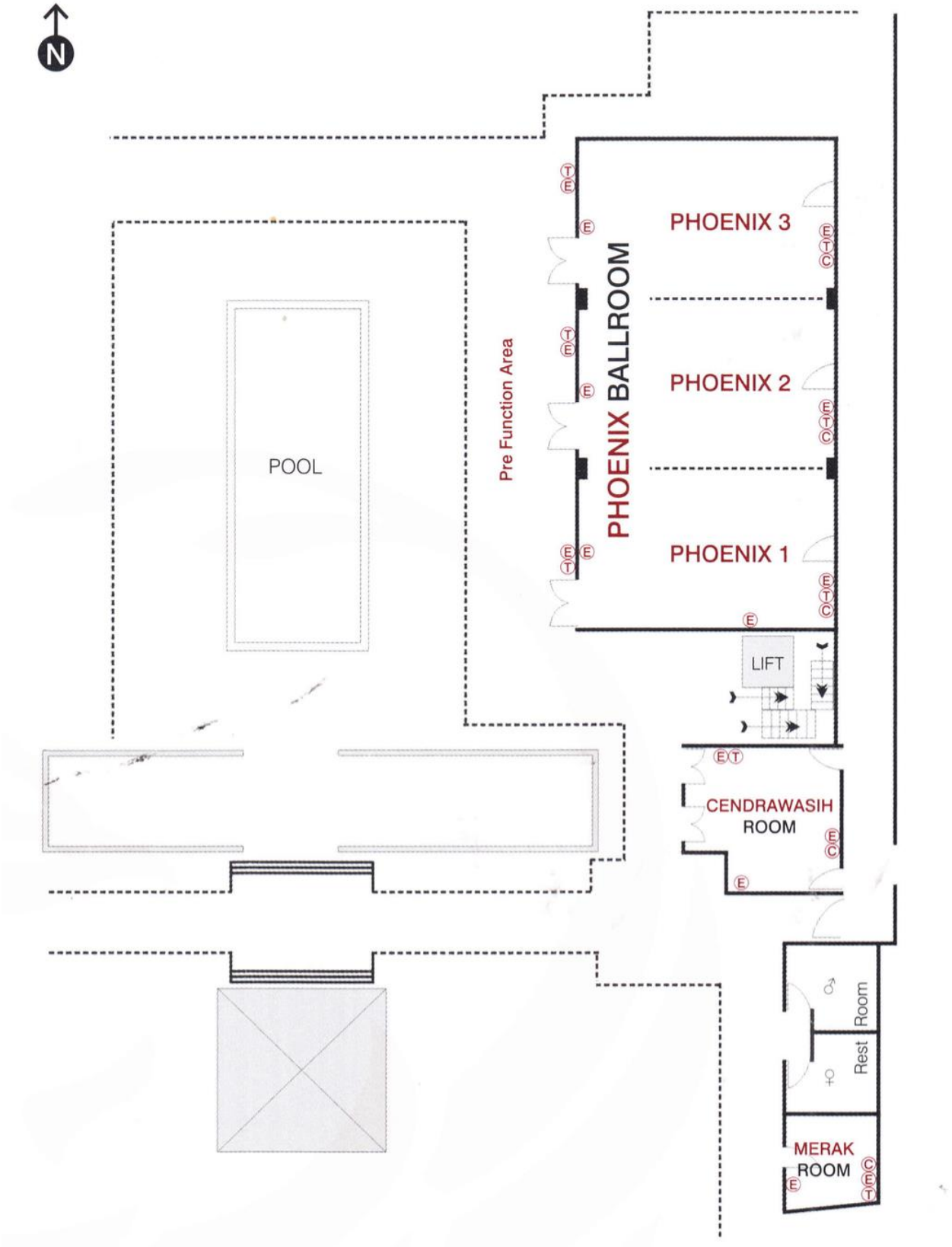
Jl. Jend. Sudirman No.9, Cokrodiningratan

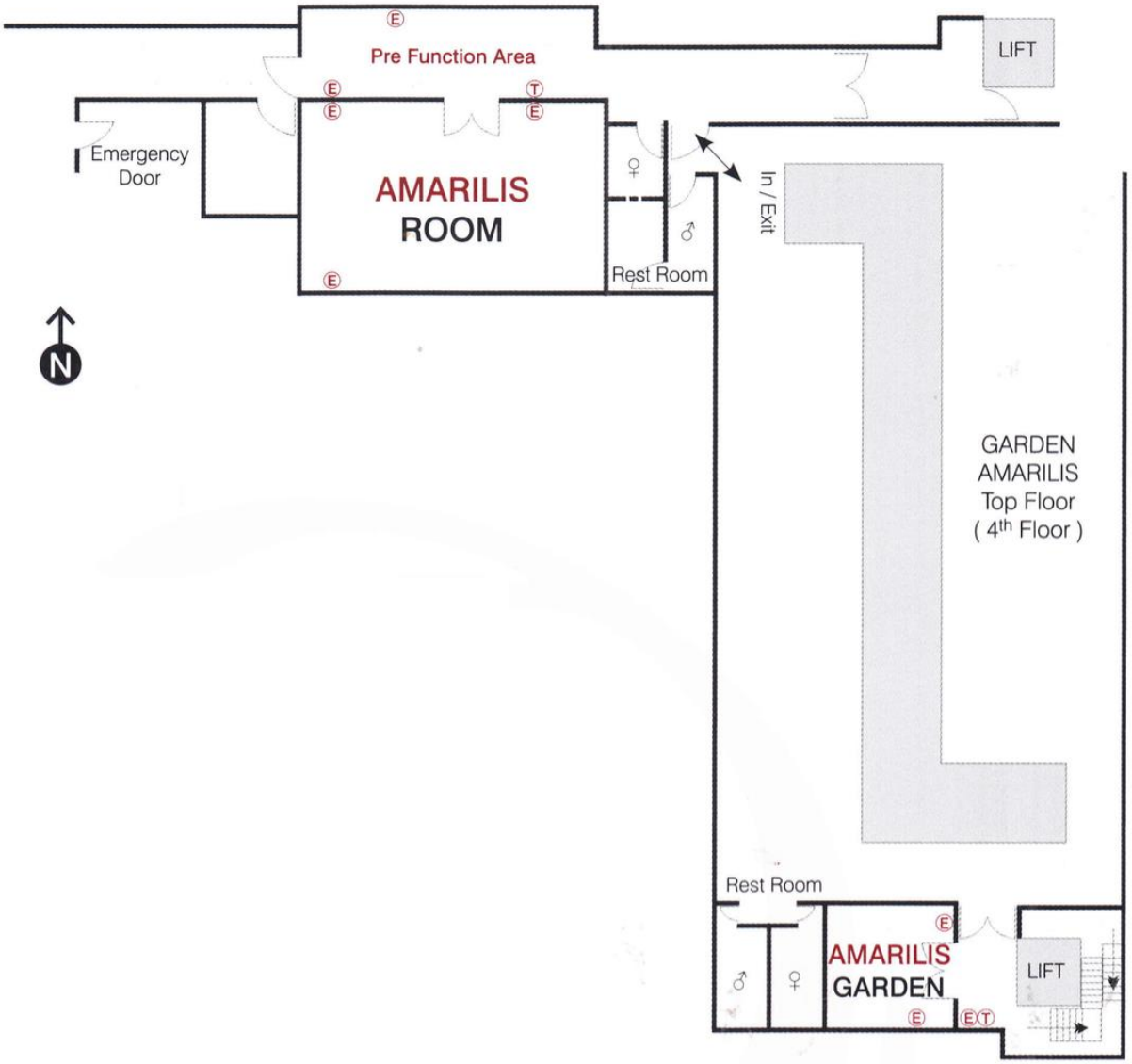
Kota Yogyakarta, Daerah Istimewa Yogyakarta

55233, INDONESIA

Scan for the link to the map of the Conference Venue Map




N
POOL
Pre Function Area
PHOENIX BALLROOM
PHOENIX 3
PHOENIX 2
PHOENIX 1
LIFT
CENDRAWASIH ROOM
Rest Room
MERAK ROOM


Pre Function Area
LIFT
Emergency Door
AMARILIS ROOM
Rest Room
In / Exit
N
GARDEN AMARILIS Top Floor (4th Floor)
Rest Room
AMARILIS GARDEN
LIFT

REGISTRATION

Registration Fee

Regular (non-Member)	USD 300 per paper (International)
	IDR 4.000.000 per paper (Domestic)
Regular (IEEE Member*)	USD 200 per paper (International)
	IDR 2.750.000 per paper (Domestic)
Student **	USD 150 per paper (International)
	IDR 2.000.000 per paper (Domestic)
Participant	USD 75 (International)
	IDR 1.000.000 (Domestic)
Student Participant***	IDR 300.000

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*Valid as a member at the day of the conference.
** Accompanied by a supporting letter from the university indicating that the registrant is still an active student at the day of the conference and the student must be the first author.
***Excluding Gala Dinner.

ICACSIS 2018 PROGRAM SCHEDULE

Saturday, October 27th, 2018-CONFERENCE			
Time	**Event**	**Event Details**	**Room(s)**
07.30-08.30	Registration		Phoenix 1 & 2
08.30-08.35	Opening Ceremony	Opening speech from the General Chair of ICACSIS 2016, **Yudho Giri Sucahyo, Ph.D.**	
08.35-08.40		Opening speech from the Dean of Faculty of Computer Science Universitas Indonesia (**Mirna Adriani, Ph.D**)	
08.40-08.45		Welcome speech Representative of Universitas Kristen Maranatha	
08.45-08.50		Opening by TBD.	
08.50-09.00		ICACSIS Participants Photo Session	
09.00-09.05	Break		
09.05-09.50	Plenary Speech !	**Prof. Sherah Kurnia** University of Melbourne, AU	Phoenix 1 & 2
09.50-10.05	Coffee Break		
10.05-10.50	Plenary Speech II	**Prof. Toshio Fukuda** Beijing Institute of Technology and Meijo University, JP	Phoenix 1 & 2
10.50-11.00	Breakout		
11.00-12.00	Parallel Session I	Reliable Software Engineering, General Papers, and Digital Distance Library and Learning	Phoenix 1&2, Cendrawasih, Amarilis
12.00-13.00	Lunch Break		
13.00-13.45	Plenary Speech III	**Prof. Fumihito Arai** Nagoya University, JP	Phoenix 1 & 2
13.45-13.50	Breakout		
13.50-14.50	Parallel Session II	Machine Learning & Computer Vision, Information Retrieval, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis
14.50-15.15	Coffee Break		

15.15-16.15	Parallel Session III	Machine Learning & Computer Vision, General Papers, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis
16.15-17.15	Parallel Session IV	Machine Learning & Computer Vision, General Papers, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis
17.15-18.30	Break		
18.30-20.30	Gala Dinner		TBD

Sunday, October 28th, 2018-CONFERENCE			
Time	**Event**	**Event Details**	**Rooms**
07.30-08.30	Registration		
08.30-09.30	Parallel Session V	Information Management, Information Retrieval, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis, Phoenix 3
09.30-09.45	Coffee Break		
09.45-10.30	Plenary Speech IV	**Betty Purwandari, Ph.D** Universitas Indonesia, ID	Phoenix 1 & 2
10.30-10.35	Breakout		
10.35-11.35	Parallel Session VI	Information Management, General Papers, Machine Learning & Computer Vision, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis, Phoenix 3
11.35-13.00	Lunch Break		
13.00-13.45	Plenary Speech V	**Prof. Subhas C. Mukhopadhyay** Macquarie University, AU	Phoenix 1 & 2
13.45-13.50	Breakout		
13.50-14.50	Parallel Session VII	Information Management, Computer Network, Architecture, & High Performance Computing, Reliable Software Engineering, and E-Government and E-Business	Phoenix 1&2, Cendrawasih, Amarilis, Phoenix 3
14.50-15.30	Break		
15.30-16.00	Closing Ceremony (Awards Announcement and Photo Session)	Awards Announcement from the General Chair of ICACSIS 2016, **Prof. Wisnu Jatmiko**	Phoenix 1 & 2

DOCTORAL CONSORTIUM 2018 PROGRAM SCHEDULE

Saturday, October 27th, 2018-CONFERENCE			
Time	**Event**	**Event Details**	**Room(s)**
07.30-08.30	Registration		Phoenix 1 & 2
08.30-09.00	ICACSIS Opening Ceremony		
09.00-09.05	Break		
09.05-09.50	Plenary Speech !	**Prof. Sherah Kurnia** University of Melbourne, AU	Phoenix 1 & 2
09.50-10.05	Coffee Break		
10.05-10.50	Plenary Speech II	**Betty Purwandari, Ph.D** Universitas Indonesia, ID	Phoenix 1 & 2
10.50-11.00	Breakout		
11.00-12.00	Doctoral Consortium – Session I		Phoenix 3
12.00-13.00	Lunch Break		
13.00-13.45	Plenary Speech III	**Prof. Fumihito Arai** Nagoya University, JP	Phoenix 1 & 2
13.45-13.50	Breakout		
13.50-14.50	Doctoral Consortium – Session II		Phoenix 3
14.50-15.15	Coffee Break		
15.15-16.15	Doctoral Consortium – Session III		Phoenix 3
16.15-17.15	Doctoral Consortium – Session IV		Phoenix 3
17.15-18.30	Break		
18.30-20.30	Gala Dinner		TBD

KEYNOTE SPEAKERS

Assoc. Prof. Sherah Kurnia
University of Melbourne, AU

Betty Purwandari Ph.D
Universitas Indonesia, ID

Prof. Fumihito Arai
Nagoya University, JP

Prof. Toshio Fukuda
Beijing Institute of Technology and
Meijo University, JP

Prof. Subhas Chandra Mukhopadhyay
Macquarie University, AU

Keynote Speech

Sustainable Supply Chain Management Adoption: Challenges and Opportunities

Sherah Kurnia

School of Computing and Information Systems, The University of Melbourne

Abstract

Due to the importance of sustainability issues facing our society, sustainable supply chain management (SSCM) has attracted the attention of researchers and practitioners globally. Effective adoption of SSCM practices can potentially lead to the creation of sustainable supply chain that is well aligned with the Sustainable Development principle that encourages ethical and responsible actions by all parties in meeting the present needs to ensure that the ability of future generations to meet their needs will not be compromised. SSCM practices require a set of capabilities which are enabled by information technologies and systems. However, SSCM practices and the enabling technologies and systems are inter-organisational in nature which complicate their adoption. Therefore, the adoption rate of SSCM practices and the related technologies has been low. Several implications to research and practice in SSCM, as well as future research directions are highlighted.

Profile

Sherah Kurnia, BComp(Hons), GCUT, PhD, is Associate Professor at the School of Computing and Information Systems, Melbourne School of Engineering, the University of Melbourne, Australia. Her teaching and research areas include electronic commerce, inter-organisational information systems, supply chain management, sustainability, strategic IT decision making and enterprise architecture. She has published over 140 refereed articles, obtained six best paper awards at leading IS conferences and published in Information and Management Journal, Journal of Business Research, Journal of Strategic Information Systems and Communications of the Association for Information Systems. She is currently an Associate Editor for Information and Management journal and the Chair of Human Ethics Advisory Group of Melbourne School of Engineering, The University of Melbourne.

Keynote Speech

The Paradox of e-Government Adoption: Lesson Learned to Better Serve the Citizens

Betty Purwandari

Faculty of Computer Science, Universitas Indonesia

Abstract

Successful adoption of e-government is very challenging. Huge investment on technologies and human resource development often fails to meet the expectation. Consequently, it has raised critics and negative sentiments on e-government implementation. On the other hand, there are needs for public sectors to keep up-to-date with Information and Communications Technology (ICT) trends, such as mobile, cloud computing, cyber security, big data analytics, and artificial intelligence. It is time to pause and reflect on lesson learned from various e-government practice and research around the globe including Indonesia. Technological, economical, managerial, organizational, institutional, and political issues on e-government implementation are discussed in this presentation. It also examines 8 identified domains of e-government adoption factors, i.e. technological support, technological acceptance, organizational structure, human resources, citizen perception, culture, government support, as well as encouragement from other stakeholders. These become foundation to move forward embracing current and future technology in e-government to better serve the citizens.

Profile

Betty Purwandari is a full time lecturer at the Faculty of Computer Science, Universitas Indonesia. She achieved her PhD in Computer Science from the University of Southampton. During her studies at the University of Southampton, Betty experienced superb IT services which raised her expectations of how a university's IT systems should be managed and delivered. She has also had the opportunity to work with world-class IT experts in Southampton. She is a scholarship recipient of The Faculty for the Future-Schlumberger Foundation. Her research interests includes Web Science, Computer Networking, Information Systems.

Keynote Speech

Innovation of Force Sensing with Wide Dynamic Range

Fumihito Arai

Dept. of Micro-Nano Mechanical Science & Engineering, Institute of Innovation for Future Society, Nagoya University

Abstract

Force Sensing is quite important for mechatronic and information systems. In this talk, we focus on the measurement range of force sensing. We have developed a force sensor using a quartz crystal resonator (QCR) with a wide measurement range of 1.5 × 10e+6 (0.4 mN to 600 N). The proposed sensor allows a higher allowable force with high sensitivity. The force sensor mainly consists of three layers, namely a QCR layer and two holding layers. As opposed to the conventional holding layer composed of silicon, quartz crystal is utilized for the holding layers to improve the temperature characteristic of the force sensor. There are many new applications of force sensor having such wide dynamic range. For example, it is effective for measurement of biosignals. Monitoring multiple biosignals, such as heart rate, respiration cycle, and weight transitions, contributes to the health management of individuals. Specifically, it is possible to measure multiple biosignals using load information obtained through contact with the environment, such as a chair and bed, in daily use. A wide-range force sensor is essential since force information contains multiple biosignals with various force ranges. Moreover, there are many new applications of force sensor having wide dynamic range. Some of our current application examples are introduced, such as a car driver monitoring and sensors for biomedical applications.

Profile

Fumihito Arai received the Master of Eng. degree from the Tokyo Univ. of Science in 1988. He joined Nagoya University, Japan in 1989 as Research Associate. He received Dr. of Eng. from Nagoya University in 1993. Since 1998, he was Associate Professor of Department of Micro System Eng., Nagoya University. Since 2005, he is Professor of Department of Bioengineering and Robotics, Tohoku University. Since April 2010, he is Professor of Department of Mechanical Science & Engineering, Nagoya University. Since October 2010, he is Professor of Department of Micro-Nano Systems Engineering, Nagoya University. He is mainly engaging in the research fields of micro- and nano-robotics and its application to the micro- and nano-assembly and cell manipulation, bio-automation systems, medical robotic systems, Micro and Nano Electro Mechanical Systems, intelligent robotic systems.He received the Early Academic Career Award in Robotics and Automation from IEEE Robotics and Automation Society in 2000. He received 55 awards on his research activities, for example, 2006 Googol Best New Application Paper Award at IEEE Trans. ASE, Best Automation Paper at ICRA2008, and

so on. He was the Vice-President for Technical Activities, IEEE Nanotechnology Council in 2002 and 2003. He is AdCom Member of IEEE Robotics and Automation Society in 2009-2011 and 2012-2014. He is the Vice President for Technical Activities, IEEE Robotics and Automation Societyl in 2014. He was the General Co-chair of MHS2013, Program Co-Chair of MHS from 1995 to 2012. He was the Program Committee member of International Conferences such as ICRA, IROS, IECON, MEMS, IEEE-NANO for long years. He was the General Chair of IEEE-NANO 2005. He is the Co-chair of IEEE Technical Committee on Micro/Nano Robotics and Automation for long years, and organized lots of Tutorials and Workshops at RAS sponsored conferences. Since 2009, he is Invited Visiting Professor, Seoul National University, Korea. Since 2011, he is Visiting Professor, University of Tokyo. Since 2015, he is Visiting Professor, Osaka University. He is the author of more than 312 journal papers, and he published many other conference papers. He submitted 28 domestic patents. He is a member of IEEE, JSME, RSJ, SICE, and so on.

Keynote Speech

Multi-Scale Robotic System - Maintenance and Enhancement of Artifact and Life

Toshio Fukuda

Beijing Institute of Technology, Nagoya University/Meijo University

Abstract

This lecture is an overview of the Multi-scale robotics, based on the Cellular Robotics System, which is the basic concept of the emergence of intelligence in the multi-scale way from Cell Level to the Organizational Level, for inspection, maintenance and enhancement of the artifact and life. The artifact and life are different from the non-bio and bio structured systems but has similarity in a way of technology for inspection. It consists of many elements how the system can be structured from the individual to the group/society levels in analogy with the biological system. It covers with the wide range of challenging topics. Then I mainly focus on maintenance of the artifacts and life: inspection and maintenance, medical robots and bio cell manipulation and cell assembly and refer to applied areas for the future hybrid cyborg and bionic system to improve the quality of life of human.

Profile

Toshio Fukuda graduated from Waseda University, Tokyo, Japan in 1971 and received the Master of Engineering degree and the Doctor of Engineering degree both from the University of Tokyo, in 1973 and 1977, respectively. He studied at Graduate School of Yale University in 1973-1975. He joined the National Mechanical Engineering Laboratory in Japan in 1977, the Science University of Tokyo in 1982, and then joined Department of Mechanical Engineering, Nagoya University, Japan in 1989. He worked at University of Stuttgart, as Humboldt Fellow in 1979-1981. He is Professor Emeritus of Nagoya University. Department of Micro and Nano-Systems Engineering and Professor of Meijo University as well as Beijing Institute of Technology.

He is mainly engaging in the research fields of intelligent robotic system, micro and nano robotics, bio-robotic system, and technical diagnosis and error recovery system.

He was the President of IEEE Robotics and Automation Society (1998-1999), Director of the IEEE Division X, Systems and Control (2001-2002), the Founding President of IEEE Nanotechnology Council (2002-2005), Region 10 Director (2013-2014) and Director of Division X, Systems and Control (2017-2018). He was Editor-in-Chief of IEEE/ASME Trans. Mechatronics (2000-2002).

He was the Founding General Chair of IEEE International Conference on Intelligent Robots and Systems (IROS) held in Tokyo (1988). He was Founding Chair of the IEEE Workshop on Advanced Robotics Technology and Social Impacts (ARSO, 2005), Founding Chair of the IEEE Workshop on System Integration International (SII, 2008), Founding Chair of the International Symposium on Micro-Nano Mechatronics and Human Science (MHS, 1990-2012).

He has received many awards such as IEEE Eugene Mittelmann Achievement Award (1997), IEEE Third Millennium Medal (2000) , Humboldt Research Prize (2003), IEEE Robotics and Automation Pioneer Award (2004), IEEE Transaction Automation Science and Engineering Googol Best New Application Paper Award (2007), George Saridis Leadership Award in Robotics and Automation (2009), IEEE Robotics and Automation Technical Field Award (2010). He received the IROS Harashima Award for Innovative Technologies (2011), Friendship Award of Liaoning Province PR China (2012), Friendship Award from Chinese Government (2014), JSME Achievement Award (2015), IROS Distinguished Service Award (2015) and Honor of Medal with the Purple Ribbon from Japanese Government (2015). Award from Automation Foundation (2016).

IEEE Fellow (1995). SICE Fellow (1995). JSME Fellow (2002), RSJ Fellow (2004), VRSJ Fellow (2011) and member of Science Council of Japan (2008-2014), Academy of Engineering of Japan (2013-), and Foreign member of Chinese Academy of Science s (2017).

Keynote Speech

IoT Based Health, Home Management and Smart City

Subhas Chandra Mukhopadhyay

Distinguished Lecturer – IEEE Sensors Council, School of Engineering Macquarie University

Abstract

The advancements in electronics, embedded controllers, smart communicating devices as well as the progress towards a better informed, knowledge based society increase the demand for small size, affordable sensors that allow accurate and reliable data recording, processing, storing and communication. This led to the paradigm known as Internet of Things (IoT) in which Wireless Sensor Nodes are most important elements. The seminar will present research activities on development of IoT and WSN based system towards managing our health and home in a better way. A holistic view of IoT, its challenges and opportunities for monitoring health of an individual as well as home will be presented. At the end the research activities on current smart city project funded by Australian government on Pedestrian counting will be shared.

Profile

Subhas holds a B.E.E. (gold medallist), M.E.E., Ph.D. (India) and Doctor of Engineering (Japan). He has over 29 years of teaching, industrial and research experience. Currently he is working as a Professor of Mechanical/Electronics Engineering, Macquarie University, Australia and is Discipline Leader of the Mechatronics Engineering Degree Programme. Before joining Macquarie he worked as Professor of Sensing Technology, Massey University, New Zealand. His fields of interest include Smart Sensors and sensing technology, instrumentation techniques, wireless sensors and network, numerical field calculation, electromagnetics etc. He has supervised over 40 postgraduate students and over 100 Honours students. He has examined over 50 postgraduate theses. He has published over 450 papers in different international journals and conference proceedings, written six books and forty book chapters and edited sixteen conference proceedings. He has also edited thirty books with Springer-Verlag and twenty journal special issues. He has organized over 20 international conferences as either General Chairs/co-chairs or Technical Programme Chair. He will organize the IEEE Sensors Conference 2021 in Sydney, Australia. He has delivered 317 presentations including keynote, invited, tutorial and special lectures. He is a Fellow of IEEE (USA), a Fellow of IET (UK), a Fellow of IETE (India), a Topical Editor of IEEE Sensors journal, and an associate editor of IEEE Transactions on Instrumentation and Measurements. He is a Distinguished Lecturer of the IEEE Sensors Council from 2017 to 2019. He is the Founding chair of IEEE IMS NSW chapter.

More details can be available at http://web.science.mq.edu.au/directory/listing/person.htm?id=smukhopa

TECHNICAL PROGRAM ICACSIS 2018

Opening Ceremony Venue: Phoenix 1 & 2	Oct 27 (Sat) 08.30-08.50

Master of Ceremony: Yudho Giri Sucahyo, Ph.D

Plenary Speech I Venue: Phoenix 1 & 2	Oct 27 (Sat) 09.05-09.50

Achieving Sustainable Supply Chain with Inter-Organisational Information Systems Adoption

Plenary Speech by Assoc. Prof. Sherah Kurnia

University of Melbourne, AU

Plenary Speech II Venue: Phoenix 1 & 2	Oct 27 (Sat) 10.05-10.50

Multi-Scale Robotic System - Maintenance and Enhancement of Artifact and Life

Prof. Toshio Fukuda

Beijing Institute of Technology and Meijo University, JP

Parallel Session I Reliable Software Engineering Venue: Phoenix 1 & 2	Oct 27 (Sat) 11.00-12.00

(942) **Framework for Privacy-Aware Web Service Logging**

Chaithat Chanakitkarnchok and Twittie Senivongse

(938) **Reasoning about Traffic Signals Controller for Intersection with Contraflow Lanes for Bus Rapid Transit Using Linear-time Temporal Logic**

Muhammad Arzaki, Yanti Rusmawati, Anggita Karlinda Kusnadi, Sarah Andianti Atmawardhana

(937) **Formal Verification of Divide and Conquer Key Distribution Protocol Using ProVerif and TLA$^+$**

Ridhwan Dewoprabowo, Muhammad Arzaki, Yanti Rusmawati

Parallel Session I General Papers Venue: Cendrwasih	Oct 27 (Sat) 11.00-12.00

(961) **Payment Type Classification on Urban Taxi Big Data using Deep Learning Neural Network**

Herley Shaori Al-Ash, Ari Wibisono, Adila Alfa Krisnadhi

(967) **Monte Carlo Tree Search to represent Dynamic difficulty in Turn-based RPG**

Hafiz Adhiyasa Pratama

(989) **Task-Technology Fit Approach to Evaluate Tourists' Purchase Intention in Open-Trip Marketplace Sites**

Baskoro Pramudito Nugroho, Muhammad Rifki Shihab, Indra Budi

(1003) **Jakpros: Reproductive Health Education Application for Pregnant Women**

Budi Wiweko*, Aida Riyanti Shanty Olivia, Muhammad Priangga, Vita Silvana, Ilonna Putri Pertiwi, Anggi Lewis Reso Putro, Yohanes Satrya Wibawa, Andon Hestiantoro, Raden Muharram, Achmad Kemal Harzif, Gita Pratama

Parallel Session I Digital Distance Library and E-Learning Venue: Room C, 2nd Floor	Oct 27 (Sat) 11.00-12.00

(945) **Customer Loyalty in Go-Food: The Antecendent of Satisfaction**

Sumarliyanti, Putu W. Handayani, Qorib Munajat

(1025) **Progressive Learning Design Strategy to Improve Impact Maturity of Charity Organizations**

Irma Latifatul Laily, Oman Komarudin, Suci Fadhilah, Ade Azurat

(909) **Dynamic Thresholding Mechanisms for IR-Based Filtering in Efficient Source Code Plagiarism Detection**

Oscar Karnalim, Lisan Sulistiani

Plenary Speech III Venue: Phoenix 1 & 2	Oct 27 (Sat) 13.00-13.45

Innovation of Force Sensing with Wide Dynamic Range

Plenary Speech by Prof. Fumihito Arai

Nagoya University, JP

Parallel Session II Machine Learning & Computer Vision Venue: Phoenix 1 & 2	Oct 27 (Sat) 13.50-14.50

(914) **Teaching Learning Based Optimization (TLBO) Algorithm for Document Clustering**

Shikha Agrawal, Jitendra Agrawal

(960) **Decision Tree Learning Approach to Wildfire Modeling on Peat and Non-Peat Land in Riau Province**

Muchamad Taufiq Anwar, Hindriyanto Dwi Purnomo, Sri Yulianto Joko Prasetyo, Kristoko Dwi Hartomo

(939) **Human Identification Using Human Body Features Extraction**

Martino C. Khuangga & Dwi H. Widyantoro

Parallel Session II Information Retrieval Venue: Cendrawasih	Oct 27 (Sat) 13.50-14.50

(982) **Information Extraction for Mobile Application User Review**
Erry Suprayogi, Indra Budi, Rahmad Mahendra

(1067) Analysis of Indonesian Sentiments Using Indonesian Lexicon by Considering Denial
Feby Tri Saputra, Yani Nurhadryani

(908) **Query Classification Algorithm based Information Retrieval System**
Naw Thiri Wai Khin, Nyo Nyo Yee

Parallel Session II E-Government and E-Business Venue: Amarilis	Oct 27 (Sat) 13.50-14.50

(1060) **Success Factor Analysis of Jakarta Siaga 112 Emergency Service Management System**
Leney Nadeak, Betty Purwandari, Riri Satria, Larastri Kumaralalita

(1073) **Using Social Networking Sites for Learning Experiences by Indonesian University Students**
Achmad Fauzi Azmi, Rena Nuravianty, Tashia Indah Nastiti, Dana Indra Sensuse

(899) **Balance Scorecard Modification to Measure Supplier Performance for Online Travel Agent Case Study: Klikhotel.com**
Niko Ibrahim, Diana Trivena Yulianti, Verliyantina, Andre Christian

(906) **Impact of User Awareness, Trust, and Privacy Concerns on Sharing Personal Information on Social Media: Facebook, Twitter, and Instagram**
Valentinus Paramarta, Muhammad Jihad, Ardhian Dharma, Ika Chandra Hapsari, Puspa Indahati Sandhyaduhita and Achmad Nizar Hidayanto

Parallel Session III Machine Learning and Computer Vision Venue: Phoenix 1 & 2	Oct 27 (Sat) 15.15-16.15

(1002) **Hate Speech Detection on Indonesian Instagram Comments using FastText Approach**
Nur Indah Pratiwi, Indra Budi, and Ika Alfina

(1001) **Betawi Traditional Food Image Detection using ResNet and DenseNet**
Noer Fitria Putra Setyono, Dina Chahyati, Mohamad Ivan Fanany

(998) **Experimental Analysis of Iterative-Scaling Fuzzy Additive Spectral Clustering (is-FADDIS) for Cancer Subtypes Identification**
Muhamad Fathurahman, Ionia Veritawati, Ito Wasito

(996) **Tourist Attractions Classification using ResNet**
Nanda Maulina Firdaus, Dina Chahyati, Mohamad Ivan Fanany

Parallel Session III General Papers Venue: Cendrawasih	Oct 27 (Sat) 15.15-16.15

(1028) **Assessment of Mobile Applications' Credibility in Users' Content-Searching Behavior based on PIT Theory**

Ayu Rahma Haninda, Irwansyah

(1033) **UTAUT in Communication Technology of Learning Management System**

Sri Retno Ekayanti, Irwansyah

(978) **How is Informatics Education Student Impression in Using Metacognitive Training System at The First Time?**

Mukhamad Angga Gumilang, Indriana Hidayah, Wahyu Nur Hidayat, Setiadi Cahyono Putro

(1021) **GTRAS: Graphical Tracking Activity System for Problem-Posing Learning Process Insights**

Ahmad Afif Supianto

Parallel Session III E-Government and E-Business Venue: Amarilis	Oct 27 (Sat) 15.15-16.15

(1043) **The Misuse of Mobile Application by the Motorcycle Taxi Rider: An Analysis of Extended Deterrence Theory Approach**

Muhammad Teguh Brillian, Yudho Giri Sucahyo, Yova Ruldeviyani, Arfive Gandhi

(1049) **Requirements for Startup Survival with the Platform-based Business Model: A Qualitative Exploratory Study**

Ade Maulana, Yudho Giri Sucahyo, Yova Ruldeviyani, Arfive Gandhi

(1050) **Technology Criteria Analysis and E-Voting Adoption Factors in the 2019 Indonesian Presidential Election**

Hillary Goretta, Betty Purwandari, Larastri Kumaralalita, Oldyson Tri Anggoro

(1057) **Analysis of Factors that Influence Purchase Intention on Omni-channel Services**

Herio Susanto, Yudho Giri Sucahyo, Yova Ruldeviyani, Arfive Gandhi

Parallel Session IV Machine Learning and Computer Vision Venue: Phoenix 1 & 2	Oct 27 (Sat) 16.15-17.15

(963) **Classification of Limestone Mining Site using Multi-Sensor Remote Sensing Data and OBIA Approach A case study: Biak Island, Papua**

Daniel Sande Bona, Aniati Murni Arymurthy, Petrus Mursanto

(953) **Sign Language System for Bahasa Indonesia (Known as SIBI) Recognizer using TensorFlow and Long Short-Term Memory**

Kustiawanto Halim, Erdefi Rakun

(930) **Geometric Facial Components Feature Extraction for Facial Expression Recognition**
Dewi Yanti Liliana, M. Rahmat Widyanto, T. Basaruddin

(896) **Two Layer Network Flow for Fast Data Association on Multi Object Tracking**
Bariqi Abdillah, Grafika Jati, Wisnu Jatmiko

Parallel Session IV General Papers Venue: Cendrawasih	Oct 27 (Sat) 16.15-17.15

(1069) **Design of A Task-Oriented Autonomous Wheeled-Robot for Search and Rescue**
Karlisa Priandana, Medria Hardhienata, M. Iqbal Choironi, Rakean G. D. Pawitra, Wulandari, Sri Wahjuni, Agus Buono

(1071) **Examiners Recommendation System at Proposal Seminar of Undergraduate Thesis by Using Content-based Filtering**
Ristu Saptono

(900) **Digital Investigation of Wireless Sensor Networks - IRIS Mote**
Argianto Rahartomo, Arne Bochem, Omar Alfandi

(947) **String Transformations Preserving Analogies**
Yves Lepage

Parallel Session IV E-Government and E-Business Venue: Amarilis	Oct 27 (Sat) 16.15-17.15

(993) **Designing A Conceptual Model for Smart Government in Indonesia using Delphi 2nd Round Validity**
Assaf Arief, Dana Indra Sensuse

(974) **The Determinant Factors of Individual Performance from Task Technology Fit and IS Success Model perspectives: a case of Public Procurement Plan Information System (SIRUP)**
Alifiannisa Lawami Diar, Puspa I. Sandhyaduhita, Nur Fitriah A. Budi

(988) **Analysis of Factors Affecting User's Intention in Using Mobile Health Application: A Case Study of Halodoc**
Clarissa Nuralifa, Putu Wuri Handayani, Fatimah Azzahro

(1034) **Understanding the Customers' Perception in Motorcycle Ride-Sharing on Personal Data Protection**
Rosalia Valentin Margareta, Yudho Giri Sucahyo, Yova Ruldeviyani, Arfive Gandhi

Parallel Session V Information Management Venue: Phoenix 1 & 2	Oct 28 (Sun) 08.30-09.30

(990) **The Importance of Computer Science in Industry 4.0**

Harry T. Yani Achsan, Wahyu Catur Wibowo, Heryudi Ganesha, M. Muhtar Baswara Achsan, Wahyuningdiah Trisari Harsanti Putri

(959) **Information Security Awareness Measurement for Employee: Case Study at XYZ Firm**

Alvin Cindana, Yova Ruldeviyani

(964) **Implementation of Lean Methods on Management of IT Infrastructure Monitoring System: A Case Study of PT Kalbe Farma**

Dio Pratama, Rizal Fathoni Aji, Setiadi Yazid

(980) **Designing Data Governance Structure Based On Data Management Body of Knowledge (DMBOK) Framework: A Case Study on Indonesia Deposit Insurance Corporation (IDIC)**

Mutiara Aisyah, Yova Ruldeviyani

Parallel Session V Information Retrieval Venue: Cendrawasih	Oct 28 (Sun) 08.30-09.30

(915) **Music Era Classification using Hierarchical-level Fusion**

M Octaviano Pratama, Mirna Adriani

(957) **Analysis and Implementation Measurement of Semantic Similarity Using Content Management Information on WordNet**

Tommy Wijaya Sagala, Achmad Nizar Hidayanto, Nur Fitriah Ayuning Budi, Theresia Wati, Solikin

(1042) **Recording of Law Enforcement Based on Court Decision Document Using Rule-based Information Extraction**

Firdaus Solihin, indra budi

(1044) **Harvesting Bibliography Multi-thread, Safe and Ethical Web Crawling**

Harry Tursulistyono Yani Achsan, Wahyu Catur Wibowo, Wahyuningdiah Trisari Harsanti Putri, M. Muhtar Baswara Achsan, Quintin Kurnia Dikara Barcah

Parallel Session V E-Government and E-Business Venue: Amarilis	Oct 28 (Sun) 08.30-09.30

(951) **Designing Concept Model for Rice Information System using Gamification and SSM**

Mochammad Arief Hermawan Sutoyo

(1006) **Investigating the Influence of Attitude toward Traveler's Intention to Book Open Trip Service from Open Trip C2C Marketplace Website**

Adinda Nadinta Juliana, Muhammad Rifki Shihab

(977) **The Role of Risk and Quality in Establishing Perceived Value Affecting the Intention to Book a Tour Package Through an Open Trip Marketplace Site**

Ayesha Maharani Putri, Muhammad Rifki Shihab, Nur Fitriah Ayuning Budi

(983) **Enumeration and Handling Security Issues of Government Official Web Application**

Abdullah Fajar, Setiadi Yazid

Parallel Session V Computer Network, Architecture, & High Performance Computing Venue: Phoenix 3	Oct 28 (Sun) 08.30-09.30

(1023) **Fingerprint Indexing based on Ridge Orientation and Frequency on GPU**

Michael Tjandra, Achmad Imam Kistijantoro

(1036) **Smart Scheduler for CUDA Programming in Heterogeneous CPU/GPU Environment**

Naajil Aamir Khan, Nida Pervaiz, Dr Hasina Khatoon, Atika Burney, Muhammad Bilal Latif, Mubashir Baig, Mirza Zaeem Baig

(1047) **Development of Mobile Contactless Solution Using Near Field Communication (NFC)-Based Transport Payment Platform With Haversine Algorithm**

Wellanie M. Molino, Dr. Joel B. Mangaba

Plenary Speech IV Venue: Phoenix 1 & 2	Oct 28 (Sun) 09.45-10.30

The Paradox of e-Government Adoption: Lesson Learned to Better Serve the Citizens

Plenary Speech by Betty Purwandari, Ph.D

Universitas Indonesia, ID

Parallel Session VI Information Management Venue: Phoenix 1 & 2	Oct 28 (Sun) 10.35-11.35

(1004) **The Analysis of Critical Success Factor Ranking of Software Development and Implementation Project Using AHP**

Ryann Octavianus, Petrus Mursanto

(1011) **Defining Software Quality Rank using Analytic Hierarchy Process and Object-Oriented Metrics**

Petrus Mursanto, Dameria Christina Pasaribu

(1040) **Data Governance Maturity Model (DGM2) Assessment in Organization Transformation of Digital Telecommunication Company: Case Study of PT Telekomunikasi Indonesia**

Dimas Agung Saputra, Dika Handika, Yova Ruldeviyani

Parallel Session VI General Papers Venue: Cendrawasih	Oct 28 (Sun) 10.35-11.35

(1032) **An Analysis and Design of Downstreaming Decision System on Palm Oil Agroindustry Based on Multilabel Classification**

Safriyana, Taufik Djatna, Marimin, Elisa Anggraeni, Illah Sailah

(948) **Numerical Methods for Retrieval and Adaptation in Nagao's EBMT mode**

Kun He, Tianjing Zhao, Yves Lepagel

(1024) **Recording of Law Enforcement Based on Court Decision Document Using Rule-based Information Extraction**

Ulfah Aprilliani, Zuherman Rustam

Parallel Session VI E-Government and E-Business Venue: Amarilis	Oct 28 (Sun) 10.35-11.35

(905) **Combining Entropy and Importance Performance Analysis (IPA) Method for Improving Information Quality on Government's Social Media: A case of Ministry of Finance (KEMENKEU)**

Hendry Tju, Ima Zanu Setyaningrum, Arifianita Febrina Putri, Faizal Nasution, Achmad Nizar Hidayanto, Nur Fitriah Ayuning Budi

(943) **Obstacle Factor Analysis of E-Government Implementation at The Ministry of Tourism**

Jayanti Kartika Putri, Dana Indra Sensuse

(1009) **Factors Affecting Knowledge Management System Implementation in Development Planning Agency of Southern Sumatera Province**

Andy Syahrizal, Dana Indra Sensuse, Gilang Bintang Hakkun Ashshidhiqi, Kuncoro Wicaksono Adi Baroto, Muhammad Fuad Dwi Rizki, Roby Eko Primadi

(1066) **Analysis of Higher Education Student's Behavior Factors to Posting a Comment on E-Commerce with Stimulus Organism Response (SOR) Model**

Meyliana, Yakob Utama Chandra

Parallel Session VI Machine Learning and Computer Vision Venue: Phoenix 3	Oct 28 (Sun) 10.35-11.35

(893) **2-Dimensional Homogeneous Distributed Ensemble Feature Selection**

Machmud Roby Alhamidi, Dewa Made Sri Arsa, Wisnu Jatmiko

(911) **Real-Time 3-D Motion Gesture Recognition using Kinect2 as Basis for Traditional Dance Scripting**

Andi W.R. Emanuel, Andreas Widjaja

(985) **Wind Speed Forecasting Using Multivariate Time-Series Radial Basis Function Neural Network**

Nur Hamid, Wahyu Catur Wibowo

(927) **Deep Structured Convolutional Neural Network for Tomato Diseases Detection**
Endang Suryawati, Rika Sustika, R. Sandra Yuwana, Agus Subekti and Hilman F. Pardede

Plenary Speech V Venue: Phoenix 1 & 2	Oct 28 (Sun) 13.00-13.45

IoT Based Health, Home Management and Smart City

Plenary Speech by Prof. Subhas C. Mukhopadhyay

Macquarie University, AU

Parallel Session VII Computer Network, Architecture, & High Performance Computing Venue: Phoenix 1 & 2	Oct 28 (Sun) 13.50-14.50

(1019) **Efficiency Improvement of Normal Basis Galois Field Inverter Using Circular Shift Squarer**
Petrus Mursanto, Aulia Roza Albareta

(994) **Protagoras: A Service for Tagging E-Commerce Products at Scale**
Alfan Nur Fauzan, Rahmatri Mardiko, Prayana Galih

(1012) **Minutia Cylinder Code-based Fingerprint Indexing Optimization using GPU**
Jason Jeremy Iman, Achmad Imam Kistijantoro

Parallel Session VII Information Management Venue: Cendrawasih	Oct 28 (Sun) 13.50-14.50

(966) **The Story Development of Penal Law Online News Articles Visualization**
Aditio Pangestu & Dwi H. Widyantoro

(920) **Partial-Replicated Dynamic Fragment Allocation in Distributed Database System**
Nang Khine Zar Lwin

(944) **Teleconsultation as Knowledge Management System: Recognizing the Issues Contributing to Its Underutilization in Hospitals**
Ramli, R, Ali, N

Parallel Session VII E-Government and E-Business Venue: Amarilis	Oct 28 (Sun) 13.50-14.50

(1059) **Factor Analysis of Intention to Use Garuda Indonesia Mobile Application**
Satria Ramadhan, Betty Purwandari, Puspa Indahati Sandhyaduhita, Larastri Kumaralalita, M Singgih Zulfikar Ansori

(1014) **EZ Parking: Smart Parking Space Reservation Using Internet of Things**
Mostafa Didar Mahdi, Zahid Hasan Anik, Rahbar Ahsan, Tamanna Motahar

(1022) **An Empirical Study on Factors that Influence the Digital Startup Sustainability**
Endrik Endrik, Yudho Giri Sucahyo, Yova Ruldeviyani, Arfive Gandhi

Parallel Session VII Reliable Software Engineering Venue: Phoenix 3	Oct 28 (Sun) 13.50-14.50

(1008) **Proposed User Interface Generation for Software Product Lines Engineering**
Siti Ina Sakinah, Hafiyyan Sayyid Fadhlillah, Ade Azurat, Maya R.A Setyautami

(1000) **Analyzing of Implementation Enterprise Budgeting System Using SAP BPC Case Study on a Financial Government Institution**

Ridho Ahdiat Wijaya, Prima Widyaningrum. Budi Prasetyo, Riri Satria

Closing Ceremony Venue: Venue: Phoenix 1 & 2	Oct 28 (Sun) 15.30-16.00

Master of Ceremony: Prof. Wisnu Jatmiko, Dr. Eng.

PRESENTER'S SCHEDULE

(Ordered by First Author's First Name)

A

Abdullah Fajar			
Enumeration and Handling Security Issues of Government Official Web Application (983)			
Amarilis Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 4

Achmad Fauzi Azmi			
Using Social Networking Sites for Learning Performance: The Case of University Students (1073)			
Amarilis Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 2

Ade Maulana			
The Misuse of Mobile Application by the Motorcycle Taxi Rider: An Analysis of Extended Deterrence Theory Approach (1049)			
Amarilis Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 2

Adinda Nadinta Juliana			
Investigating the Influence of Attitude toward Traveler's Intention to Book Open Trip Service from Open Trip C2C Marketplace Website (1006)			
Amarilis Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 2

Aditio Pangestu			
The Story Development of Penal Law Online News Articles Visualization (966)			
Cendrawasih Room	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 1

Ahmad Afif Supianto			
GTRAS: Graphical Tracking Activity System for Problem-Posing Learning Process Insights (1021)			
Cendrawasih Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 4

Alfan Nur Fauzan			
Protagoras: A Service for Tagging E-Commerce Products at Scale (994)			
Cendrawasih Room	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 3

Alifiannisa Lawami Diar			
The Determinant Factors of Individual Performance from Task Technology Fit and IS Success Model perspectives: a case of Public Procurement Plan Information System (SIRUP) (974)			
Amarilis Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 2

Alvin Cindana			
Information Security Awareness Measurement for Employee: Case Study at XYZ Firm (959)			
Phoenix 1 & 2	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 2

Andi Wahju Rahardjo Emanuel			
Real-Time 3-D Motion Gesture Recognition using Kinect2 as Basis for Traditional Dance Scripting (911)			
Phoenix 3	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 2

Andy Syahrizal			
Factors Affecting Knowledge Management System Implementation in Development Planning Agency of Southern Sumatera Province (1009)			
Amarilis Room	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 3

Argianto Rahartomo			
Digital Investigation of Wireless Sensor Networks - IRIS Mote (900)			
Cendrawasih Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 3

Assaf Arief			
Designing A Conceptual Model for Smart Government in Indonesia using Delphi 2nd Round Validity (993)			
Amarilis Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 1

Ayesha Maharani Putri			
The Role of Risk and Quality in Establishing Perceived Value Affecting the Intention to Book a Tour Package Through an Open Trip Marketplace Site (977)			
Amarilis Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 3

Ayu Rahma Haninda			
Assessment of Mobile Applications' Credibility in Users' Content-Searching Behavior (1028)			
Cendrawasih Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 1

B

Bariqi Abdillah			
Two Layer Network Flow for Fast Data Association on Multi Object Tracking (896)			
Phoenix 1 & 2	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 4

Baskoro Pramudito Nugroho			
Task-Technology Fit Approach to Evaluate Tourists' Purchase Intention in Open Trip Marketplace Sites (989)			
Cendrawasih Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 3

Budi Wiweko			
Jakpros: Reproductive Health Education Application for Pregnant Women (1003)			
Amarilis Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 1

C

Chaithat Chanakitkarnchok			
Framework for Privacy-Aware Web Service Logging (942)			
Phoenix 1 & 2 Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 1

Clarissa Nuralifa			
Analysis of Factors Affecting User's Intention in Using Mobile Health Application: A Case Study of Halodoc (988)			
Amarilis Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 3

D

Daniel Bona			
Classification of Limestone Mining Site using Multi Sensor Remote Sensing Data and OBIA Approach A case study: Biak Island, Papua (963)			
Phoenix 1 & 2 Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 1

Dewi Yanti Liliana			
Geometric Facial Components Feature Extraction for Facial Expression Recognition (930)			
Phoenix 1 & 2 Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 3

Dimas Agung Saputra			
Data Governance Maturity Model (DGM2) Assessment in Organization Transformation of Digital Telco Company: Case Study of PT Telekomunikasi Indonesia (1040)			
Phoenix 1 & 2 Room	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 3

Dio Pratama			
Implementation of Lean Methods on Management of IT Infrastructure Monitoring System: A Case Study of PT Kalbe Farma (964)			
Phoenix 1 & 2	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 3

E

Erry Suprayogi			
Information Extraction for Mobile Application User Review (982)			
Cendrawasih Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 1

Endang Suryawati			
Deep Structured Convolutional Neural Network for Tomato Diseases Detection (927)			
Phoenix 3	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 4

Endrik			
An Empirical Study on Factors that Influence the Digital Startup Sustainability (1022)			
Amarilis Room	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 4

F

Feby Tri Saputra			
Analysis of Indonesian Sentiments Using Indonesian Lexicon by Considering Denial (1067)			
Cendrawasih Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 3

Firdaus Solihin			
Recording of Law Enforcement Based on Court Decision Document Using Rule-based Information Extraction (1042)			
Cendrawasih Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 3

H

Hillary Goretta			
Technology Criteria Analysis and E-Voting Adoption Factors in the 2019 Indonesian Presidential Election (1050)			
Amarilis Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 3

Hafiz Adhiyasa Pratama			
Monte Carlo Tree Search to represent Dynamic difficulty in Turn-based RPG (967)			
Cendrawasih Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 2

Harry Tursulistyono Yani Achsan			
The Importance of Computer Science In Industry 4.0 (990)			
Phoenix 1 & 2 Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 1
Harvesting Bibliography: Multi-thread, Safe and Ethical Web Crawling (1044)			
Cendrawasih Room	**Parallel Session VI** 13.00-14.00	Oct 28 (Sun)	Presenter 4

Hendry Tju			
Combining Entropy and Importance Performance Analysis (IPA) Method for Improving Information Quality on Government's Social Media: A case of Ministry of Finance (KEMENKEU) (905)			
Amarilis Room	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 1

Herio Susanto			
Analysis of Factors that Influence Purchase Intention on Omni-channel Services (1057)			
Amarilis Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 4

Herley Shaori Al-Ash			
Payment Type Classification on Urban Taxi Big Data using Deep Learning Neural Network (961)			
Cendrawasih Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 1

I

Irma Latifatul Laily			
Progressive Learning Design Strategy to Improve Impact Maturity of Charity Organizations (1025)			
Amarilis Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 2

J

Jason Jeremy Iman			
Minutia Cylinder Code-based Fingerprint Indexing Optimization using GPU (1012)			
Phoenix 1 & 2 Room	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 3

Jayanti Kartika Putri			
Obstacle Factor Analysis of E-Government Implementation at The Ministry of Tourism (943)			
Amarilis Room	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 2

K

Karlisa Priandana			
Design of A Task-Oriented Autonomous Wheeled-Robot for Search and Rescue (1069)			
Cendrawasih Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 1

Kun He			
Numerical Methods for Retrieval and Adaptation in Nagao's EBMT model (948)			
Cendrawasih Room	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 2

Kustiawanto Halim			
Sign System for Bahasa Indonesia Known as SIBI (Sistem Isyarat Bahasa Indonesia) Recognizer using TensorFlow and Long Short-Term Memory (953)			
Phoenix 1 & 2 Room	**Parallel Session IV** 16.15-17.15	Oct 27 (Sat)	Presenter 2

L

Leney Nadeak			
Success Factor Analysis of Jakarta Siaga 112 Emergency Service Management System (1060)			
Amarilis Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 1

M

M Octaviano Pratama			
Music Era Classification using Hierarchical-level Fusion (915)			
Cendrawasih Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 1

Machmud Roby Alhamidi			
2-Dimensional Homogeneous Distributed Ensemble Feature Selection (893)			
Phoenix 3	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 1

Martino Christiano Khuangga			
Human Identification Using Human Body Features Extraction (939)			
Phoenix 1 & 2 Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 3

Michael Tjandra			
Fingerprint Indexing based on Ridge Orientation and Frequency on GPU (1023)			
Phoenix 3 Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 1

Mochammad Arief Hermawan Sutoyo			
Designing Concept Model for Rice Information System using Gamification and SSM (951)			
Amarilis Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 1

Mostafa Didar			
EZ Parking: Smart Parking Reservation using Internet of Things (1014)			
Amarilis Room	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 2

Muchamad Taufiq Anwar			
Decision Tree Learning Approach to Wildfire Modeling on Peat and Non-Peat Land in Riau Province (960)			
Phoenix 1 & 2 Room	**Parallel Session II**	Oct 27 (Sat)	Presenter 2

	13.45-14.45		

Muhamad Fathurahman			
Experimental Analysis of Iterative-Scaling Fuzzy Additive Spectral Clustering (is-FADDIS) for Cancer Subtypes Identification (998)			
Phoenix 1 & 2 Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 3

Muhammad Arzaki			
Reasoning about Traffic Signals Controller for Intersection with Contraflow Lanes for Bus Rapid Transit Using Linear-time Temporal Logic (938)			
Phoenix 1 & 2 Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 2

Muhammad Teguh Brillian			
The Misuse of Mobile Application by the Motorcycle Taxi Rider: An Analysis of Extended Deterrence Theory Approach (1043)			
Amarilis Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 1

Mukhamad Angga Gumilang			
How is Informatics Education Student Impression in Using Metacognitive Training System at The First Time? (978)			
Cendrawasih Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 3

Mutiara Aisyah			
Designing Data Governance Structure Based on Data Management Body of Knowledge (DMBOK) Framework: A Case Study on Indonesia Deposit Insurance Corporation (IDIC) (980)			
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Smart Scheduler for CUDA Programming in Heterogeneous CPU/GPU Environment (1036)			
Phoenix 3 Room	**Parallel Session V** 08.30-09.30	Oct 28 (Sun)	Presenter 2

Nanda Maulina Firdaus			
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Phoenix 1 & 2 Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 4

Nang Khine Zar Lwin			
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Naw Thiri Wai Khin			
Query Classification Algorithm based IR System (908)			
Cendrawasih Room	**Parallel Session II** 13.45-14.45	Oct 27 (Sat)	Presenter 3

Niko Ibrahim			
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Noer Fitria Putra Setyono			
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Nur Hamid			
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Phoenix 3	**Parallel Session VI** 10.35-11.35	Oct 28 (Sun)	Presenter 3

Nur Indah Pratiwi			
Hate Speech Detection on Indonesian InstagramComment using FastText Approach (1002)			
Phoenix 1 & 2 Room	**Parallel Session III** 15.15-16.15	Oct 27 (Sat)	Presenter 1

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Oscar Karnalim			
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Amarilis Room	**Parallel Session I** 11.00-12.00	Oct 27 (Sat)	Presenter 3

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Petrus Mursanto			
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Ridho Ahdiat Wijaya			
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Phoenix 3	**Parallel Session VII** 14.00-15.00	Oct 28 (Sun)	Presenter 2

Ridhwan Dewoprabowo			
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Ryann Octavianus			
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Safriyana Safriyana			
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Real-Time 3-D Motion Gesture Recognition using Kinect2 as Basis for Traditional Dance Scripting

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***Abstract* – This preliminary study presents a system capable of recognizing human gesture in real-time. The gesture is acquired from a Kinect2 sensor which provides skeleton joints represented by three-dimensional coordinate points. The model set consists of eight motion gestures is provided for basis of gesture recognition using Dynamic Time Warping (DTW) algorithm. DTW algorithm is utilized to identify in real time manner by measuring the shortest combined distances in x, y, and z coordinates in order to determined the matched gesture. It can be shown that the system is able to recognize these 8 motions in real time with some limitations. The findings of the this study will provide solid foundation of further research in which the ultimate goal of the research is to create system to automatically recognize sequence of motions in Indonesian traditional dances and convert them into standardized Resource Description Framework (RDF) scripts for the purpose of preserving these dances.**

***Index Terms* – gesture recognition; Dynamic Time Warping; Kinect2; Indonesian traditional dances; Resource Description Framework.**

I. INTRODUCTION

Indonesia is a great country with large cultural differences. With the number of populations reaching more than 236 millions in 1340 races [1], it ranks as the fourth largest country in the world in population. Many of these cultural differences is viewed as the cultural richness which act as one of the unifying factors of Indonesia as a country. One of the important cultural heritage is Indonesia traditional dances which need to be preserved properly in the increasingly digital society.

One of the cultural activities in Indonesia that need to be preserved into standardized written format is its traditional dances. There is already written notations used to preserve ballet / dance movements, namely Labanotation or Kinetography Laban [2], but it is deemed not suitable for Indonesian Traditional dances due to complexities. According to an Indonesian Javanese traditional dancer expert, Labanotation is not sufficient to preserve Indonesian traditional dances due to the more complexity in terms of movement details of these dances compared to ballet. Currently, many of dance practitioners and creators use their own notations in writing for their choreographic sequences. Due to their own non-standardized nature of the script, only the dance creators themselves and their advanced learners these masters would be able to understand these customized and personalized scripts.

There should be a standardized format to script these Indonesian traditional dances which will make preservation, analysis, and other studies are possible. Therefore, the ultimate goal of this research is to make a standardization of digital scripting of Indonesian traditional dances. This is the preliminary findings of the research relating to the real-time 3-D motion gesture recognition as an attempt to automate the process of scripting these traditional dances.

II. CURRENT STUDIES

A. Gesture and Motion Recognition

There are already many studies relating to gesture and motion recognition for hand or the whole body. The studies of hand gestures or motion recognition are conducted by Kurakin using depth sensor [3], Rimkus *et al* [4], Li [5], and Wang *et al* using Kinect [6]. There are also studies on implementation of hand gesture and motion recognition relating to spatio temporal gesture segmentation [7], and sign language recognition [8] [9].The other studies of hand gesture and motion recognition for HCI [10], learning tool for robot [11], and video signature [12]. As for the human gesture identification, there are already some studies conducted by Biswas using Kinect [13], Schlomer *et al* using Wii controler [14], and more specifically used for posture

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recognition [15] [22] [23], estimation of elderly posture [16], detecting human [17], controlling robot [18], virtual evaluator for dance performer [19], recognizing dance motion [20], and human motion biometric [21][24].

B. Indonesian Traditional Dances

Indonesian traditional dances have been subjects for several studies in terms of the dances themselves and the technological approaches to the dances. Some studies regarding the traditional dances such as religio-magis aspects of Srimpi Anglir mendhung dance [25], Bedoyo Ketawang dancer's dodot costume [26], and status and significance of Bedhaya Semang dance [27]. Whereas the studies relating to the technological approaches in Indonesian traditional dances such as the use of Hidden Markov Model (HMM) for dance modeling, learning and recognition of Aceh traditional dances [28] and traditional dance digitalization [29], evaluating performance of balinese dancers [30], and Indonesian traditional dances spatial information system [31].

In this preliminary study, which is the continuation of previous work [32], the research ultimate attempt is to standardize the script format of Indonesian traditional dances and the way to automate to process of scripting from live dance action. In order to be able to script the Indonesian traditional dances, the initial study is to create a system that is able to recognize the motion sequence in real-time manner. The Indonesian traditional dances such as Javanese dances are usually a sequence of several standardized basic movements. Most of Javanese traditional dance usually consists of a sequence of these basic motions. For example, Javanese traditional dances such as tari Serimpi, Bondan, Bedhaya, etc. are performed in slow motion. Despite that the dances have complex motions, they are consisting of variations of tempo, position and movements, because of their relatively slow motion, they may be identified by their main basic motions only, neglecting minor details, hence this will enable accurate motion recognition. The verification by dance experts about the motions being recorded is also can be performed. The variations of similar dances performed in different regions such as in Surakarta, Yogyakarta dan other regions are interesting to be observed and studies if the standard format of preservation is available.

III. Research Methodology

A. Basic Concepts

Currently, the most common option in preserving traditional dances is recording and storing them in video format and store them in the web or online video repositories such as daily motion, YouTube, etc. However, preserving traditional dances in form of video has several disadvantages such as the difficulty in studying, comparing and analyzing these dances for researches. Further more, most of video file formats are actually bitmap data stream, as opposed to vector data stream; therefore they are relatively large in file size.

Regarding those matters, the proposed method is a way to script these dances in the form of RDF (Resource Description Framework) format [33]. The captured motion sequences is translated into script written in RDF format which should be beneficial for the purpose of studying and analysing for later use. The research will also attempt to create RDF script of the traditional dances out of the motion recognition systems. The usage of this standardized RDF script will enable further studies for the benefit of future studies. The proposed system is shown in Figure 1.

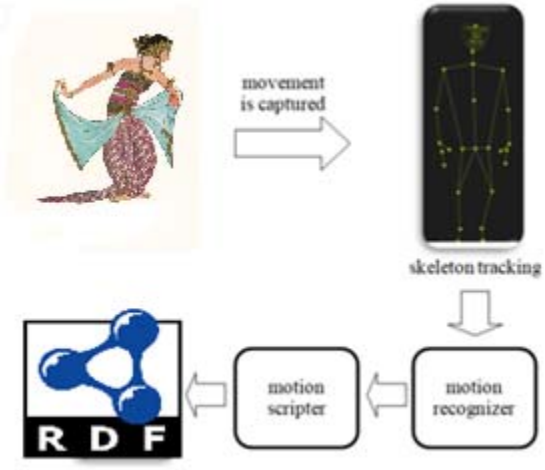

Figure 1 - Indonesian traditional dances preservation system. Image source: dancer **[34]**

Figure 1 shows that the motions of the dancer will be captured by Kinect2, and the Kinect2 is connected to PC by utilizing Kinect2 SDK. The skeleton movement is then processed by motion recognition sub-system to identify the movement. The identified movement is then translated into RDF format by the motion scripter sub-system.

B. Algorithm

The algorithm in identifying the motion must be fast and efficient in order to be able to perform in real-time. Among those candidate algorithms are Hidden Markov Model (HMM) [35], Bayesian classifiers [36], and Dynamic Time Warping (DTW) [37]. One suitable algorithm suitable fo this preliminary study in is DTW due to its time-invariant nature. DTW is versatile so that many researchers have utilized DTW for various purposes such as spoken words [38], connected-word recognition [39], music and motion [40], time series of

big data [41], and gesture recognition comparison [42]. Some improved versions of the algorithm have also been developed such as SparseDTW [43], FastDTW [44], and Weighted DTW [10].

DTW is basically is a technique to measure similarities, by finding an optimal alignment, between two given time-series which may vary in speed [45] [46]. Suppose there are two time-series, X of length $n \in$ □ and Y of length $m \in$ □, written as sequences:

$$X = (x_1, x_2, \cdots, x_n), \tag{1}$$

$$Y = (y_1, y_2, \cdots, y_m). \tag{2}$$

A matrix **M** = $[m_{ij}]$ of size n-by-m is constructed to align the sequences X and Y, where

$$m_{ij} = d(x_i, y_j), \qquad i = 1 \ldots n, \; j = 1 \ldots m, \tag{3}$$

where

$$d(x_i, y_j) = |x_i - y_j|, \tag{4}$$

Every element m_{ij} of **M** corresponds to the points x_i and y_j alignment. There is a contiguous path in terms of matrix elements of **M**, namely a warping path P which defines a mapping of X and Y,

$$P = (p_1, p_2, \cdots, p_K), \tag{5}$$

where

$$\max(n, m) \le K < n + m. \tag{6}$$

Here we denote the k^{th} element of P as

$$p_k = (i, j)_k. \tag{7}$$

Because the warping path P is an alignment of two sequences, therefore it must be subjected to three constrains [37]:

a. **Monotonicity**: The warping path is forced to increase monotonically in time, that is

$$\text{if } p_k = (i, j)_k \text{ and } p_{k+1} = (i', j')_{k+1}, \quad \text{then } i \le i' \text{ and } j \le j'. \tag{8}$$

b. **Continuity**: The warping path steps which are restricted to adjacent (including diagonal) cells only, that is

$$\text{if } p_k = (i, j)_k \text{ and } p_{k+1} = (i', j')_{k+1}, \quad \text{then } i' - i \le 1 \text{ and } j' - j \le 1. \tag{9}$$

c. **Boundary conditions**: The warping path is restricted to start and finish at lower left corner and upper right corner of the matrix, respectively, that is

$$p_1 = (1,1)_1 \text{ and } p_K = (n, m)_K. \tag{10}$$

The above constrains are not satisfied by a unique path, instead there are many warping paths which satisfy them. However, the selected path is where the warping cost

$$W = \sum_{k=1}^{K} p_k, \tag{11}$$

is minimum, that is, the DTW "distance" between X and Y is

$$\mathrm{DTW}(X, Y) = \min\left(\sum_{k=1}^{K} p_k\right). \tag{12}$$

To find such a path, a dynamic programming technique is applied by defining a cumulative distance function, $c(i, j)$, which is computed as a recurrence relation

$$c(i, j) = d(x_i, y_j) + \min(c(i-1, j), c(i-1, j-1), c(i, j-1)), \tag{13}$$

In which $c(i, j)$ is the point distance$d(x_i, y_j)$ plus the minimum of the cumulative distances of its adjacent elements.

To illustrate, in figure 2 the DTW of two artificial time series X and Y and the corresponding warping path is demonstrated.

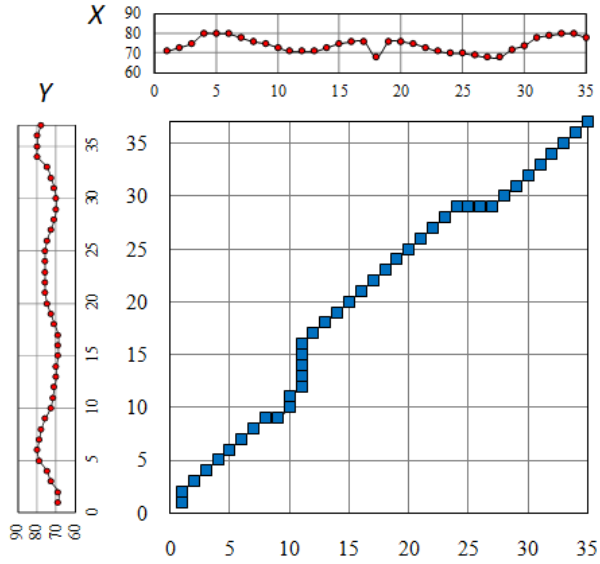

Figure 2 – Warping path of two time-series X and Y

The DTW distance shown in Figure 2 is only for a single dimension. In the actual implementation in this study, the combined DTW distance is used which is the combined DTW distance from x, y, and z axes.

C. Hardware and Software Tools

The hardware setting of our system consists of a PC with AMD A12-9800 quad core processor, 8 GB DDR4 RAM, USB 3.0 or USB 3.1. Kinect2 motion sensor is

connected to the PC using Kinect2 to PC Adapter. The system is attached to a tripod for sensor stabilizer. The software setting of our system consists of Windows 10 Operating System and Kinect2 SDK as the driver of the Kinect2 sensor. Processing IDE, a Java based interpreter, is used with Oracle Java 8 SDK. The source code itself was a modification of the "Kinect v2 for Processing" code examples by Thomas Sanches Lengeling available at the Processing IDE Examples. The DTW library for Kinect is adapted from Cheol-Woo Jung (cjung@gatech.edu). The block diagram of the system is shown in Figure 3 below.

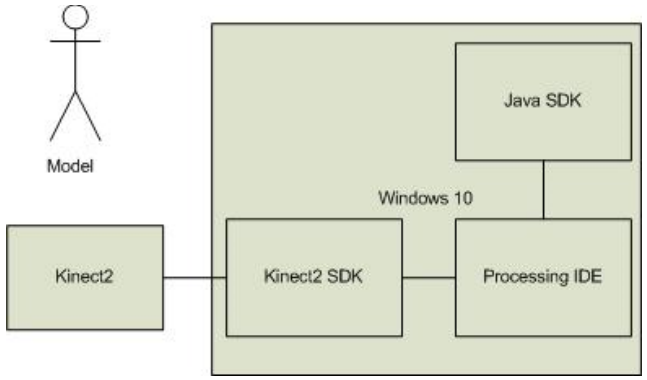

Figure 3. Block Diagram of 3D Gesture Recognition System

The x, y, and z coordinates of the Kinect2 system is unique, in which the center point of the screen is the x = 0 and y = 0, with z coordinate represents the distance of the model to Kinect2 sensor. The x, y, and z coordinates is in a form of decimal number and must be multiplied by 1000 to enable easy calculation for the DTW distances. The default screen size output of the Kinect v2 for Processing is 1920 x 1080 pixels.

IV. Results and Analysis

The model sets consisting of 8 motions are recorded using the system as the basis of gesture recognition. The recorded gestures are

Step Left, Step Right, Hand Left, Hand Right,

Hand Leg Left, Hand Leg Left, Bow, and *Squat*.

Each of the above gestures has three axes (x, y, z) coordinates of 25 skeleton joints captured by Kinect2 with sample size of 35 points in time, in which each time point is separated by 50 ms. Each model set motion is recorded using a model and then stored in CSV format.

These gesture set are loaded and stored in the system every time the system is started. For real time gesture recognition, the system stores the skeleton joints information from Kinect2 in a 50 points three-dimensional array. The system will store the x, y, and z coordinates of 25 joints into the array continuously and compared to the 8 gesture sets using DTW algorithms in x, y, and z axes and combining the distance into a single number. The "matched" motion is identified if the minimum value of combined DTW "distance", computed using Eq. (12), of x, y and z axes with minimum combined threshold of 0.27. This combined threshold value is determined by trial-and-error basis. Based on the experiments, the system is able to recognize the real-time motion as shown in Figure 4. The system is able to identify and counts the 8 recognized motions.

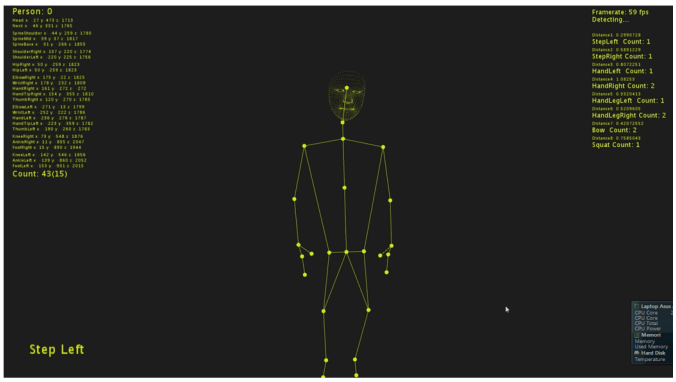

Figure 4 - Snapshot of 3D motion gesture recognition

There are some missed identifications during the experiments due to several factors that needed to be explored further. The most noticeable factor that prevents the motion identifications is the ambient light in which the brighter the ambient light will increase the possibility of detection. The other factor the distance of the Kinect2 to the model which may varies. The size of the model compared to the size of the model in the train set also need to be analyzed further. The last factor that needs to be considered is the selection of the more accurate algorithm in which the DTW may not be the best algorithm. Improvements in terms of accuracy will be done by applying multi-dimensional DTW algorithm without assumption of x, y, z axes independence. In terms of speed, DTW algorithm can be optimized, or perhaps utilizing other algorithms. Furthermore, more complex movements can be added into the model set in order to improve accuracy of detecting traditional dances.

V. Conclusion and Future Works

Our 3D motion gesture recognition system is able to identify 8 simple motions which are step left, step right, hand left, hand right, hand leg left, hand leg right, bow and squat. The identification is performed using one-dimensional DTW algorithm assuming the independence of the x, y, and z axis. Further research need to be conducated in improving the performance of the system. It can be concluded from this preliminary studies that the creation of standard RDF scripts which records the Indonesian traditional dance movements is highly feasible.

This preliminary result provides significant improvement in the quest for the ideal system to capture Indonesian traditional dances and convert the recognized sequence of of motions in the dances into RDF Format. The next steps of the research are:

1. Improving the accuracy of the gesture recognition by observing other algorithms or improving existing DTW library.
2. Improving the system to be able to identify more gestures with longer and more complex movements.
3. Finding the suitable RDF syntax to represents the sequences of motions in Indonesian traditional dances.
4. Testing the system by using simple Indonesian tradtional dances especially Javanese dances such as Gambyong, Serimpi, etc.
5. Using the system and the RDF script to start the preservation of Indonesian traditional dances.

This research is still only in preliminary stage and need about 3 – 4 years before it is able to reach its ultimate goal.

REFERENCES

[1] Badan Pusat Statistik, Statistik Politik 2016 (Katalog 4601003), Jakarta: Badan Pusat Statistik, 2016 .

[2] A. Hutchinson, Labanotation or Kinetography Laban: The System of Analyzing and Recording Movement, New York: Theatre Arts Books, 1977.

[3] A. Kurakin, Z. Zhang and Z. Liu, "A Real Time System for Dynamic Hand Gesture Recognition with A Depth Sensor," in *20th European Signal Processing Conference (EUSIPCO 2012)*, Bucharest, Romania, 2012.

[4] K. Rimkus, A. Bukis, A. Lipnickas and S. Sinkevicius, "3D Human Hand Motion Recognition System," in *The 6th International Conference on. IEEE*, 2013.

[5] Y. Li, "Hand Gesture Recognition using Kinect," in *IEEE 3rd International Conference on. IEEE*, 2012.

[6] B. Wang, Z. Chen and J. Chen, "Gesture Recognition by Using Kinect Skeleton Tracking System," in *2013 Fifth International Conference on Intelligent Human-Machine System and Cybernetics*, 2013.

[7] J. Alon, V. Athitsos, Q. Yuan and S. Sclaroff, "A Unified Framework for Gesture Recognition and Spatiotemporal Gesture Segmentation," *IEEE Transactions of Pattern Analysis and Machine Intelligence (PAM),* vol. 31, no. 9, pp. 1685 - 1699, September 2009.

[8] D. Aryanie and Y. Heryadi, "American Sign Language-Based Finger-spelling," in *IEEE 2015 3rd International Conference on Information and Communication Technology (ICoICT)*, 2015.

[9] Z. Ren, J. Meng, J. Yuan and Z. Zhang, "Robust Hand Gesture Recognition with Kinect Sensor," in *19th ACM international conference on Multimedia*, 2011.

[10] S. Celebi, A. Aydin, T. Temiz and T. Arici, "Gesture Recognition Using Skeleton Data with Weighted Dynamic Time Warping," in *VISAPP (1)*, 2013.

[11] L. M. Pedro and G. A. d. P. Caurin, "Kinect Evaluation for Human Body Movement," in *4th IEEE RAS & EMBS International Conference. IEEE*, 2012.

[12] Y. Heryad and A. Arymurthy, "Video Fingerprinting Using Image Salient Points on Circular-Based Video Time Slices," in *9th International Conference on Information and Communication Technology and System (ICTS)*, 2015.

[13] K. Biswas and S. Basu, "Gesture Recognition using Microsoft Kinect," in *IEEE 5th International Conference on Automation, Robotics and Applications (ICARA)*, 2011.

[14] T. Schlomer, B. Poppinga, N. Henze and S. Boll, "Gesture Recognition with a Wii Controller," in *2008 The 2nd International Conference on Tangible and Embedded Interaction*, Bonn, Germany, 2008.

[15] H. Shum, E. Ho, Y. Jiang and S. Takagi, "Real-Time Posture Reconstruction for Microsoft Kinect," *IEEE Transactions on Cybernetics,* vol. 43, no. 5, pp. 1357 - 1369, 2013.

[16] S. Obdržálek and e. al, "Accuracy and Robustness of Kinect Pose Estimation in the Context of Coaching of Elderly Population," in *2012 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2012.

[17] L. Xia, C. Chen and J. Aggarwal, "Human Detection Using Depth Information by Kinect," in *2011 IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, 2011.

[18] A. Malima, E. O. and M. Cetin, "A fast algorithm for vision-based hand gesture recognition for robot control," 2006.

[19] S. Essid and e. al, "An Advanced Virtual Dance Performance Evaluator," in *IEEE International Conference on. IEEE*, 2012.

[20] Y. Heryadi, M. Fanany and A. Arymurthy, "Stochastic Regular Grammar-based Learning for Basic Dance Motion Recognition," in *IEEE 2013 International Conference on Advanced Computer Science and Information Systems (ICACSIS)*, 2013.

[21] B. Munsell, A. Temlaykov, C. Qu and S. Wang, "Person Identification Using Full-Body Motion," in *European Conference On Computer Vision. Springer*, Heidelberg, 2012.

[22] S. Sempena, N. U. Maulidevi and P. R. Aryan, "Human Action Recognition Using Dynamic Time Warping," in *2011 International Conference on Electrical Engineering and Informatics*, Bandung, Indonesia, 2011.

[23] G. Papadopoulos, A. Axenopoulos and P. Daras, "Real-time Skeleton-tracking-based Human Action Recognition Using Kinect Data," *MMM,* vol. 1, 2014.

[24] J. Preis, M. Kessel and M. Werner, "Gait Recognition with Kinect," in *1st international workshop on kinect in pervasive computing*, New Castle,

UK, 2012.

[25] M. Supriyanto, "Religio - Magis Srimpi Anglirmendhung di Keraton Surakarta (he Magis Religious Aspect of the Anglir Mendhung Srimpi in the Court of Surakarta)," *Hamonia: Journal of Arts Research and Education,* vol. 2, no. 2, 2001.

[26] Pujianto, "Tiga Dunia Dalam Kain Dodot Penari Bedoyo Ketawang," *Imaji,* vol. 10, no. 1, pp. 15 - 22, February 2012.

[27] J. Hostetler, "Bedhaya Semang: The Sacred Dance of Yogyakarta," *Archipel,* vol. 24, no. 1, pp. 127 - 142, 1982.

[28] N. Anbarsanti and A. Prihatmanto, "Dance Modelling, Learning and Recognition System of Aceh Traditional Dance Based on Hidden Markov Model," *Jurnal Teknologi,* vol. 78, no. 2-2, pp. 73 - 81, 2016.

[29] Z. Ulfah, A. Wuryandari and Y. Priyana, "Inverse Kinematics and Gesture Pattern Recognition using Hidden Markov Model on BeatMe! Project: Traditional Dance Digitalization," in *The 5th International Conference on Electrical Engineering and Informatics 2015*, Bali, Indonesia, 2015.

[30] Y. Heryadi, M. Fanany and A. Arymurthy, "A Syntactical Modeling and Classification for Performance Evaluation of Bali Traditional Dance," in *IEEE International Conference on Advanced Computer Science and Information Systems (ICACSIS)*, 2012.

[31] A. Budiono and M. Fairuzabadi, "Sistem Informasi Spasial Tarian Adat Indonesia Berbasis Web Multimedia," *Jurnal Dinamika Informatika,* vol. 4, no. 2, pp. 101 - 110, September 2010.

[32] A. Emanuel dan A. Widjaja, "Feasibility Study of Scripting Indonesian Traditional Dance Motion in XML Format," dalam *2017 2nd International Conferences on Information Technology, Information Systems and Electrical Engineering (ICITISEE)*, Yogyakarta, Indonesia, 2017.

[33] W3C Semantic Web, "Resource Description Framework," [Online]. Available: https://www.w3.org/RDF/. [Diakses 25 September 2018].

[34] Winter Secret, January 2016. [Online]. Available: https://writerssecrets.wordpress.com/2016/01/12/paradoks/. [Diakses 1 September 2017].

[35] L. R. Rabiner, "A Tutorial on Hidden Markov Models and Selected Applications in Speech Recognition," *Proceedings of the IEEE,* vol. 77, no. 2, pp. 257-286, 1989.

[36] L. Devroye, L. Gyorfi and G. Lugosi, A probabilistic theory of pattern recognition, Berlin: Springer, 1996.

[37] E. Keogh and C. A. Ratanamahatana, "Exact indexing of dynamic time warping," *Knowledge and Information Systems,* vol. 7, no. 3, pp. 358-386, 2005.

[38] H. Sakoe and S. Chiba, "Dynamic programming algorithm optimization for spoken word recognition," *IEEE Transactions on Acoustics, Speech and Signal Processing,* vol. 26, no. 1, pp. 43-49, 1978.

[39] C. S. Myers and L. R. Rabiner, "A Comparative Study of Several Dynamic Time-Warping Algorithms for Connected-Word Recognition," *Bell System Technical Journal,* vol. 60, no. 7, pp. 1389-1409, 1981.

[40] Müller and Meinard, "Dynamic Time Warping," in *Information Retrieval for Music and Motion*, Berlin, Springer, 2007, pp. 69-84.

[41] Rakthanmanon and Thanawin, "Addressing Big Data Time Series: Mining Trillions of Time Series Subsequences Under Dynamic Time Warping," *ACM Transactions on Knowledge Discovery from Data,* vol. 7, no. 3, p. 10:1–10:31, 2013.

[42] P. Doliotis, A. Stefan, C. McMurrough, D. Eckhard and V. Athitsos, "Comparing Gesture Recognition Accuracy Using Color and Depth Information," in *ACM the 4th international conference on PErvasive technologies related to assistive environments*, 2011.

[43] G. Al-Naymat, S. Chawla and J. Taheri, "SparseDTW: A Novel Approach to Speed up Dynamic Time Warping," *The 2009 Australasian Data Mining. ACM Digital Library,* vol. 101, pp. 117-127, 2009.

[44] S. Salvador and P. Chan , "FastDTW: Toward Accurate Dynamic Time Warping in Linear Time and Space," in *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Workshop on Mining Temporal and Sequential Data, pp. 70-80*, Seattle, 2004.

[45] J. B. Kruskall dan M. Liberman, "Chapter 4: The symmetric time warping algorithm: from continuous to discrete," dalam *Time warps, string edits and macromolecules: The theory and practice of sequence comparison*, Reading, Massachusetts, Addison Wesley, 1983, pp. 124-161.

[46] L. Rabiner dan B.-H. Juang, Fundamentals of speech recognition, Englewood Cliffs, NJ: Prentice Hall, 1993.

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