CONFERENCE PROGRAM

WAIE 2021

2021 3rd International Workshop on
ARTIFICIAL INTELLIGENCE
AND EDUCATION

November 19-21, 2021 | Virtual Conference

Beijing Time (GMT +8:00)

Sponsored by

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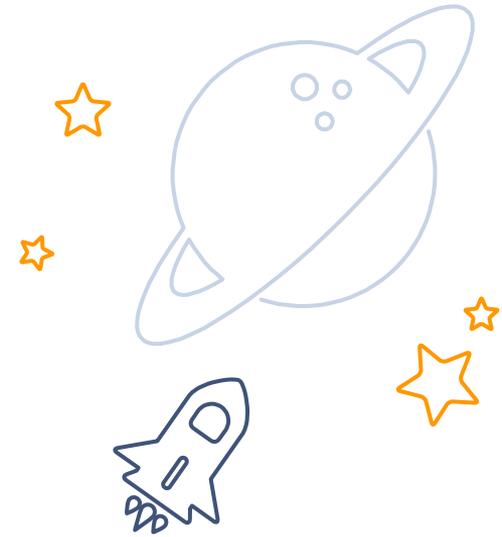XIDIAN UNIVERSITY

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#CONFERENCE MATERIALS

◆   Zoom Guidance (click)   *For new users.*

◆   Virtual Background.jpg (click)

◆   Electronic Banner.jpg (click)

Dear colleagues and friends,

On behalf of the conference organizing committees, we are delighted to welcome you to the joint virtual conference of 2021 3rd International Workshop on Artificial Intelligence and Education (WAIE 2021), to be held from November 19 to 21, 2021.

The objective of the conference is to provide a premium platform to bring together researchers, scientists, engineers, academics and graduate students to share up-to-date research results. We are confident that during this time you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long term, profitable and sustainable communication among researchers and practitioners in the related scientific areas.

This year's program is composed of 2 oral sessions, and 3 keynote speeches delivered respectively by **Prof. Makoto Iwasaki** (IEEE Fellow, Nagoya Institute of Technology, Japan), **Prof. Shengquan Yu** (Beijing Normal University, China), **Prof. Yew-Soon Ong** (IEEE Fellow, Nanyang Technological University, Singapore) and 1 plenary speech given by **Prof. Bob Fox** (University of New South Wales Sydney, Australia). We would like to express our gratitude to all the speakers in this conference. Special thanks to all of our committee members, all the reviewers, and the attendees for your active participation. We hope the conferences will be proved to be intellectually stimulating to us all.

Finally, we wish you a very successful conference!

Yours Sincerely
WAIE 2021 Conference Organizing Committee

Essential Information

Please make sure you are aware of the following details before the conference.

Time Zone

GMT +8:00
Beijing Time
Please be aware of time difference between this and your region/country.

Name Setting

Keynote Speaker: Keynote-Name
Committee: Position-Name
Author: Paper ID-Name
Listener: Listener-Name

Test Session

Check details of the testing time on **Friday, Nov 19**, and please make sure to show up on time.

Meeting ID

Meeting ID: **963 7618 7896**
Link: **https://zoom.us/j/96376187896**
Room will be open 30 mins in advance.

Meeting ID: 963 7618 7896
Meeting Link: https://zoom.us/j/96376187896

Zoom Test Sessions

14:00-15:00	15:00-16:00	16:00-16:30	16:30-17:00
A003	A011		
A004	CN002		
A005	CN003		
A1012	A002-A		
A010	A1002	Keynote / Plenary Speakers	[Waiting Time] for all participants who are unavailable at allocated time.
A006	A013		
CN01	WB001		
A007	CN011, CN012 CN013		
A015	CN001		
A1003	CN006		

Pre-test for Formal Session

➢ We will test screen sharing, audio, video, and how to "Raise Hand" in Zoom. Please get your presentation slides and computer equipment prepared beforehand.

➢ All the presenters are required to join the Zoom test sessions on Nov. 19, to ensure the meeting next day run smoothly.

➢ It may only take you 3min to complete the test session, then free to leave.

• Please note that times provided in the programme are according to Beijing Time (GMT +8:00).

Meeting ID: 963 7618 7896
Meeting Link: https://zoom.us/j/96376187896

Saturday
20.11.2021.

TIME	ACTIVITY	PRESENTER
Chairman: TBA		
09:00-09:10	**Opening Remarks**	TBA
09:10-09:55	**Keynote Speech I** GA-Based Practical System Identification and Auto-Tuning for Multi-Axis Industrial Robots	**Prof. Makoto Iwasaki** Fellow of IEEE, Nagoya Institute of Technology, Japan
09:55-10:40	**Keynote Speech II** Future Roles of Artificial Intelligent Teacher	**Prof. Shengquan Yu** Beijing Normal University, China
10:40-11:00		Group Photo / Break Time
11:00-11:45	**Keynote Speech III** A Peek into Artificial Intelligence for Education and Social Good	**Prof. Yew-Soon Ong** Fellow of IEEE, Nanyang Technological University, Singapore
11:45-12:30	**Plenary Speech** The New Normal: Teaching Through and Beyond COVID	**Prof. Bob Fox** University of New South Wales Sydney, Australia
12:30-13:30		Break Time

- Please note that times provided in the programme are according to Beijing Time (GMT +8:00).
- Each keynote talk includes a 5-minute Q&A session.

TIME	ACTIVITY	PRESENTER
13:30-16:15	**Session 1: Educational Theory and Information Management** Session Chair: TBA	A003 A004 A005 A1012 A010 A006 CN01 A007 A015 A1003 A011
16:15-16:30		Session Group Photo / Break Time
16:30-19:15	**Session 2: Computer Science and Communication Technology** Session Chair: TBA	CN002 CN003 CN012 A002-A A1002 A013 CN011 WB001 CN001 CN006 CN013

- Please note that times provided in the programme are according to Beijing Time (GMT +8:00).
- Each oral presentation includes a 3-minute Q&A session.
- Session Group Photo: a picture captured at the end of each session.

Saturday
20.11.2021.

GA-Based Practical System Identification and Auto-Tuning for Multi-Axis Industrial Robots

Abstract: Fast-response and high-precision motion control is one of indispensable techniques in a wide variety of high performance mechatronic systems including micro and/or nano scale motion, such as data storage devices, machine tools, manufacturing tools for electronics components, and industrial robots, from the standpoints of high productivity, high quality of products, and total cost reduction. In those applications, the required specifications in the motion performance, e.g. response/settling time, trajectory/settling accuracy, etc., should be sufficiently achieved. In addition, the robustness against disturbances and/or uncertainties, the mechanical vibration suppression, and the adaptation capability against variations in mechanisms should be essential properties to be provided in the performance. The keynote speech presents a practical auto-tuning technique based on a genetic algorithm (GA) for servo controllers of multi-axis industrial robots. Compared to conventional manual tuning techniques, the autotuning technique can save the time and cost of controller tuning by skilled engineers, reduce performance deviation among products, and achieve higher control performance. The technique consists of two main processes: one is an autonomous system identification process, involving the use of actual motion profiles of a typical robot. The other is, on the other hand, an autonomous control gain tuning process in the frequency and time domains, involving the use of GA, which satisfies the required tuning control specifications, e.g., control performance, execution time, stability, and practical applicability in industries. The proposed technique has been practically evaluated through experiments performed with an actual six-axis industrial robot.

Prof. Makoto Iwasaki

Dr. Eng., Fellow of IEEE

Department of Electrical and
Mechanical Engineering,

Nagoya Institute of Technology, Japan

09:10-09:55

Bio: Makoto Iwasaki received the B.S., M.S., and Dr. Eng. degrees in electrical and computer engineering from Nagoya Institute of Technology, Nagoya, Japan, in 1986, 1988, and 1991, respectively. Since 1991, he has been with the Department of Computer Science and Engineering, Nagoya Institute of Technology, where he is currently a Professor at the Department of Electrical and Mechanical Engineering. As professional contributions of the IEEE, he has been an AdCom member of IES in term of 2010 to 2019, a Technical Editor for IEEE/ASME TMech from 2010 to 2014, an Associate Editor for IEEE TIE since 2014, a Management Committee member of IEEE/ASME TMech (Secretary in 2016 and Treasurer in 2017), a Co- Editors-in-Chief for IEEE TIE since 2016, a Vice President for Planning and Development in term of 2018 to 2021, respectively. He is IEEE fellow class 2015 for "contributions to fast and precise positioning in motion controller design".

Meeting ID: 963 7618 7896
Meeting Link: https://zoom.us/j/96376187896

Future Roles of Artificial Intelligent Teacher

Abstract: TBA

Prof. Shengquan Yu

Beijing Normal University, China

09:55-10:40

Bio: Shengquan Yu is a professor, Director of Advanced Innovation Center for Future Education at Beijing Normal University, Director of the Joint Laboratory for Mobile Learning, Ministry of Education-China Mobile Communications Corporation. He was selected for the Ministry of Education's New Century Excellent Talent Support Program and the National Hundred Million Talents Project, and was awarded the title of "Young and Middle-aged Experts with Outstanding Contribution" by the Ministry of Human Resources and Social Security, and received a special government allowance from the State Council of China. He is the Member of the Smart Education Pilot Demonstration Expert Committee of the Ministry of Education, education consultant of Shenzhen Socialist Pilot Demonstration Zone, expert of the pilot work group of the action of promoting the construction of teachers with artificial intelligence of the Ministry of Education, member of the Academic Committee of China Education Society. He is a fellow of China E-learning Standard Committee, research fellow of China Educational Policy Research Institute.

He is the associate editor of IEEE Transactions on Learning Technologies. He is also a member of the expert committee of Research on Audio-visual Education, Research on Open Education, Research on Modern Distance Education, Information Technology Education in Primary and Secondary Schools, Information Technology Education, Digital Teaching in Primary and Secondary Schools and other journals.

His research interests include Artificial Intelligence in Education, Ubiquitous Learning, Big Data in Education, etc.

Saturday
20.11.2021.

A Peek into Artificial Intelligence for Education and Social Good

Abstract: The prevalence of data availability has significant ramifications on the evolution of artificial intelligence. This rapid growth impacts modern educators as pedagogical practices of the modern educator must evolve in tandem with learners who demand more data-driven and gamification approaches to teaching and learning. Professor Ong Yew Soon, Director of Data Science and AI Research Centre, Co-Director of the Singtel-NTU Cognitive & Artificial Intelligence Joint Lab at Nanyang Technological University (NTU) will be sharing some of his innovations in the fields of AI, and how they can be used for social good as well as advance educational practices.

Bio: Yew-Soon Ong (Fellow of IEEE) received the Ph.D. degree in artificial intelligence in complex design from the University of Southampton, U.K., in 2003. He is President's Chair Professor in Computer Science at Nanyang Technological University (NTU), and is the Chief Artificial Intelligence Scientist of the Agency for Science, Technology and Research in Singapore. At NTU, he also serves as Director of the Singtel-NTU Cognitive & Artificial Intelligence Joint Lab, and Director of the Data Science and Artificial Intelligence Research Center. He was Chair of the School of Computer Science and Engineering at NTU from 2016-2018. His research interest is in artificial and computational intelligence, presently in Memetic and Transfer optimization. He is founding Editor-in-Chief of the IEEE Transactions on Emerging Topics in Computational Intelligence and AE of IEEE TNNLS, the IEEE Cybernetics, IEEE TEVC, IEEE TAI and others. He has received several IEEE outstanding paper awards, Nanyang Education Excellence Award and was listed as a Thomson Reuters highly cited researcher and among the World's Most Influential Scientific Minds.

Prof. Yew-Soon Ong
Fellow of IEEE
Nanyang Technological University, Singapore

11:00-11:45

Meeting ID: 963 7618 7896
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Saturday
20.11.2021.

Prof. Bob Fox

University of New South Wales Sydney, Australia

11:45-12:30

The New Normal: Teaching Through and Beyond COVID

Abstract: During the COVID-19 induced lockdowns around the world, teachers were forced to think differently to teach effectively at a distance. We all expected this commitment to teaching online would soon stop and that we would be back to normal, teaching our students face-to-face with perhaps a little change, adding some increased online components into the traditional ways of teaching and adoption of some new strategies we had learnt during lockdowns on how to improve our student learning. We certainly have learnt lots in ways we can help our students learn without attending physical classrooms. However, we are now moving towards two years in lockdowns and COVID-19 is here to stay for the foreseeable future. So in the new normal world of living with longer term COVID, how can we ensure our best and good practices in teaching with and through technology be sustained and built on?

This presentation outlines models and frameworks that support consistent and sustainable curriculum and teaching that meets our student needs as well as caters for the new workplace training that will enable our students to leave university with the knowledge and flexible skills for the new environment.

Bio: Professor Bob Fox, Academic Lead Curriculum, Office of the Pro Vice-Chancellor Education at UNSW Sydney (2013-present) and Professor (AD) Innovation in Higher Education, School of Education at UNSW (2013-2019). Awarded University Teaching Fellow, The University of Hong Kong (HKU). Professor (Hon) Faculty of Education, HKU (2013-2018). 2000-2013 Associate Professor and Deputy Director, Centre for IT in Education and A/Dean (Learning Environments), Faculty of Education HKU, with one year as Professor and A/Director, Centre for Learning Enhancement and Research at Chinese University. Professor Fox was A/Director, Centre for Advancement of Education at Curtin University, Perth for 13 years; a senior lecturer in vocational training for four and a further education lecturer for two years. He has published around 150 papers on innovation, change and learning environments in higher education. His research focuses on learning, teaching and technological practice and change in higher education; blended, online and mobile learning; change and e-leadership.

01
No-Show Policy

A paper not presented will be removed from the final conference proceedings.

No refund will be approved to authors of those papers.

02
Duration of Presentation

15min

12min for presentation, and 3min for Q&A.

Presenter's certificate will be sent out by email, one week after the meeting.

03
Report File

a. PowerPoint file
b. PDF file
c. Pre-recorded video
are all acceptable.

Please join Zoom conference at least 10min before your session starts to get prepared.

04
"Best Presentation" Award

It will be selected from each virtual session by the session chair.

Please visit our website a week after the meeting for info.

The presenter will receive a certificate of "Best Presentation".

- Please note that times provided in the programme are according to Beijing Time (GMT +8:00).
- Each oral presentation includes a 3-minute Q&A session.
- Session Group Photo: a picture captured at the end of each session.

Session 1: Educational Theory and Information Management	Time: 13:30-16:15 // Meeting ID: 963 7618 7896
Session Chair: TBA	Meeting Link: https://zoom.us/j/96376187896

Time & ID	Presentation
13:30-13:45 **A003**	A Comparative Study of CF And NCF In Children's Book Recommender System **Jun Ma**, Lanzhou University, China Abstract—Recommender system has played a pivotal role in various fields and scenarios, but there are rare recommender systems for children's books aged 0-12 in China. In this paper, a deep learning named as the Neural Collaborative Filtering (shortly called NCF), is used to predict the list of recommended books for children. By comparing with the other traditional recommender algorithms, such as User-based collaborative filtering (briefly named User-CF) and Item-based collaborative filtering (briefly named Item-CF), it is found that NCF is more suitable for the recommendation of children's books than other methods. NCF has a higher accuracy than others. Through the experiment in this paper, NCF in Hit Ratio (HR) is 0.528 and 0.475 higher than User-CF and Item-CF respectively, in Normalized Discounted Cumulative Gain (NDCG) is 0.543 and 0.473 higher than the last two respectively and in Mean Average Precision (MAP) is 0.550 and 0.475 higher than the last two respectively. Therefore, among the recommender systems for children's books, the NCF model based on deep learning is fitted for the recommended scenes for children's reading, it could be optimized in the next step in further.
13:45-14:00 **A004**	Discussion on the Application Pattern of Research-And-Discussion Teaching in the Teaching of Computer Courses for Postgraduates **Xuehu Yan**, National University of Defense Technology, China Abstract—This paper analyzes and explores the background and significance of research-and-discussion teaching, preteaching preparations and specific implementation methods. Through the introduction of the teaching practice of the "information hiding technology" course, the paper explains that research-and-discussion teaching is useful for stimulating students' interest, cultivating students' academic research ability and sense of teamwork, and expanding the comprehensive knowledge of students.

Time & ID	Presentation
14:00-14:15 **A005**	Research on Mental Health of Secondary Vocational School Students Addicted to Internet **Yulu Chen**, Northwest Normal University, China Abstract—With the advent of the Internet era, the phenomenon of indulging in the Internet is becoming more and more common, especially secondary vocational students, because they have not been able to rationally deal with the temptation of the Internet. In order to reduce the phenomenon of secondary vocational school students' addiction to the Internet, this paper studies the psychology of vocational school students' addiction to the Internet, and provides corresponding solutions to this problem.
14:15-14:30 **A1012**	Model-based Customer-relationship Management System and Strategic Board Game: Analogical Training **Chien-Sing Lee**, Sunway University, Malaysia Abstract—The pandemic has caused much mental, social and financial stress. Policies and standard operating procedures have helped to alleviate some stress and create systematicity, expectancy, and predictability. This paper aims to alleviate some of the stress through model-based social customer relationship management system, an Augmented Reality board game, and two mini tourism games. The first aims to increase collaboration among stakeholders and to increase more effective and efficient resource management. The second phases players through the preparation, recruitment, attack and observation phases at a slower pace than competitive gaming. The third and fourth project introduce places and trigger memories through mini games respectively. These provide analogical training in social customer relationship management and in developing more systematic thinking, expectations, fun and mindfulness. AI-assistance would enable personalization/intelligent context-aware recommendations.
14:30-14:45 **A010**	Real-time Feedback and Evaluation Algorithm for Children ' s Digital Writing Practice **Ye Lili**, Hangzhou Normal University, China Abstract—At present, the application of handwritten numeral practice is common. However, these applications only focus on the imitation practice of drawing red, that is, they only focus on the similarity of shape, and they don't pay attention to the basic stroke order and stroke number. What's more, they can't judge the quality of digital writing and give real-time feedback. In this paper, the handwriting of children is preprocessed by mathematical morphology operation, and then the convolution neural network is used to recognize the number. After recognition, the handwriting is processed with fine lines, and the improved Hilditch algorithm is used for skeleton extraction. The next the features of handwritten numerals are extracted, such as corners, lines, arcs, the proportion and position of handwriting pixels. These features are used in the fuzzy comprehensive evaluation method to realize the real-time evaluation and feedback of handwritten numbers, and truly achieve the purpose of digital writing practice. Experiments show that the algorithm has good real-time and accuracy, and can improve the efficiency and enthusiasm of children ' s independent practice of digital writing.

Time & ID	Presentation
14:45-15:00 **A006**	A Case Study on the Practical Knowledge of Teaching: Creative Teacher of Preschool **Ting-Hua Lin**, Department of Early Childhood Care and Education, Cheng Shiu University, Taiwan Abstract—The purpose of this research is to explore the content of practical knowledge of the creative teaching for preschool teachers, and adopts the case study of qualitative research. Through purposive sampling, the participants were two preschool teachers who had won the Creative Teaching Award. The collection of interviews, observations and teaching logs, which are sorted, analyzed and summarized. The findings revealed that their self-knowledge presents creative personality traits and plays the role of teacher as a guide. They believed that the knowledge on educational goals was to promote the whole-person development of children as the focus. Their knowledge on learners includes children learning in play, children being curious individuals, and children's interests. Finally, the knowledge on the curriculum and teaching of the teachers includes thematic curriculum, guiding teaching strategies, and multiple assessment.
15:00-15:15 **CN01**	Research on Key Information Recognition System Based on Bayesian Classification **Chenran Li**, Information Science and Engineering College of Yanshan University Qinhuangdao, China Abstract— In order to improve the efficiency of image content retrieval, combined with computer vision technology, an intelligent key information detection and recognition system applied to images is proposed. The system is divided into four parts: positioning the text area, detecting key information, recognizing key information and broadcasting voice. Firstly, the image is preprocessed to obtain a clear binary image. Secondly, the dynamic line segmentation algorithm is used to obtain the candidate text areas of the image, and the non-text areas are filtered out with the revelatory rule. Then, the Bayesian classification algorithm is used to discriminate the candidate text region to obtain the key information. Finally, the image of key information is converted into editable text through Optical Character Recognition technology, and the text is converted into speech using text-to-speech conversion technology. The experimental results show that the recognition system of key information is simple and efficient, and the classification accuracy is good, which is suitable for image key information recognition.

Time & ID	Presentation
15:15-15:30 **A007**	A Classroom Students Convergent Behavior Analysis System Based on Image Recognition **Qiang Wang**, Xi'an Jiaotong University, China Abstract—Classroom behavior analysis is an effective way to evaluate the teaching effectiveness in the field of learning analytics. However, traditional classroom behavior analysis mainly focuses on the teacher's observation or manual analysis of the classroom videos, which are time-consuming, laborious and subjective. In this paper, we design and implement a classroom students convergent behavior analysis system which based on image recognition. To adapt to the teaching scene, a student face detection method based on MTCNN (Multi-task Cascaded Convolutional Networks) and a student head pose estimation method based on SSR-Net are proposed respectively. The face detection method is improved through NMS (Non-Maximum Suppression), pooling and convolution to alleviate the problems of partial occlusion, variable posture, small scale and large number of students in the classroom environment. For head pose estimation, we embed the ECA (Efficient Channel Attention) mechanism to improve detection accuracy and speed. We use the face detection and head pose estimation methods to identify the behavior of the student's head-up and then analyze the convergence of students. In the experiments, we first demonstrate the head-up detection approach which is the basic of the convergent behavior analysis is feasible and strong timeliness. Then, the equal interval sampling experiments of different classrooms prove that the convergence behavior analysis of the head-up can accurately feedback students' classroom learning and is practicality for teaching evaluation.
15:30-15:45 **A015**	Enhanced Knowledge Graph for True-false Question Generation: A Case Study in Computer Networks Course **Chen Fu**, Huazhong University of Science and Technology, China Abstract—Knowledge graph provides an ideal technical means to automatic question generation. The classical knowledge graph contains direct relationship between entities and their attributes, but it is difficult to contain implicit logical relationships, like evolution, analogy and causality. This is not conducive to the generation for logical questions. In this paper, we analyzed true-false question features in computer networks course and classified questions into three types: fact discrimination(FD) , conception discrimination(CD) and logic discrimination(LD). In order to generate these three types of question, we propose an enhanced knowledge graph (EKG). By upgrading model layer and data layer, we can use inheritance relationship to describe knowledge points from the same knowledge domain. This helps to find analogical knowledge more conveniently. We label the implicit logical relationships between entities and use reference sentence to support and explain these logical relationships. Finally, we construct an EKG by using computer networks knowledge and analysis the true-false question generated by our EKG to verify the help of EKG with question generation.

Time & ID	Presentation
15:45-16:00 **A1003**	To What Extent Virtual Simulation Technology Can Aid Education **Molan Yang**, Tsinghua International School, China Abstract—Virtual simulation technology has recently been used in a variety of fields including architecture, medicine and more. Nevertheless, there is not much application of this technology in education, particularly high school education. Through the COVID-19 pandemic, people have begun to recognize the power of online learning. One limitation of current online education (aka 1.0 version of online education) is that it continues to adopt the conventional classroom education method and only resolves the difficulty of long-distance communication, rather than fully leveraging computer technology, which leads to a lack of interaction and practical experience. Virtual simulation technology (aka 2.0 version of online education) can assist to plug this breach by creating virtual classrooms and erecting an education system based on virtual scenes that is more advantageous to students. Additionally, Virtual Classroom is open-source and intended to run on the majority of devices; thus it can benefit more students, including those who have no access to high-quality resources, at an extremely low rate.
16:00-16:15 **A011**	Document-aware Information Extractor for Chinese Medical Dialogue **Yifei He**, Georgia Institute of Technology, China Abstract—Electronic medical records (EMRs) are one of themethods to help doctors effectively manage and analyze patientmedical records. These EMRs not only help doctors save a lot oftime to analyze medical records, but also reduce the hospital'sdemand for doctors and reduce hospital expenditure costs.Therefore, we proposed the document-aware informationextractor (DIE) to effectively extract the information about thepatient's physical condition in the conversation between the doctorand the patient. In this paper, we proposed a encoder-decodermodel to extract the medical items amongst the doctor-patientdialogue for further usage of EMRs generation. The experimentalresult shows that our model achieves better results compared tothe baseline models, which indicates the model effectiveness.

Session 2: Computer Science and Communication Technology	Time: 16:30-19:15 // Meeting ID: 963 7618 7896
Session Chair: TBA	Meeting Link: https://zoom.us/j/96376187896

Time & ID	Presentation
16:30-16:45 **CN002**	Design of Unlicensed Dual Band Quasi-Yagi Antenna Using Semi-Bowtie for Indoor Wireless Power Transfer Application **Mohd Hezri Abdullah**, School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Penang 14300, Malaysia Abstract— This paper focuses on antenna for harvesting energy from a dedicated transmitter. The potential novel quasi-Yagi antenna with semi-bowtie driven element can be used as part of rectenna due to its characteristic of having directional properties and considerably wide bandwidth covering the Industrial, Scientific, and Medical (ISM) band consists of 863-870 MHz band and 902-928 MHz band. The modified quasi-Yagi is designed on a low-cost FR4 substrate with a physical size of 130 x 100 mm2 equivalent to $0.35\lambda o$ x $0.27\lambda o$. The antenna has a peak directivity of 2.7 dBi and peak gain of 2.2 dBi in the targeted unlicensed bands with bandwidth of 14.4% for the range between 0.820-0.944 GHz. The shift in the resonant frequency is achieved by varying the phase shifter length and maintaining the same width for consistency. The antenna's operating frequency range varies between 0.8 GHz until 1 GHz which is less than 1 GHz by using semi-bowtie as driven element with a specific 7.22◦ flare angle. The phase shift arm length of the antenna has been studied and simulated by using Computer Simulation Technology (CST) software and verified by using analytical equations. The simulated results are in accordance with the results obtained using analytical method……
16:45-17:00 **CN003**	LoRaWAN Network Planning At Frequency 920-923 MHz for Electric Smart Meter: Study Case in Indonesia Industrial Estate **Puspa Rahmawati**, Telecommunication Engineering Institut Teknologi Telkom Purwokerto, Purwokerto 53147, Indonesia Abstract—This paper plans a LoRaWAN network for smartmeters in Karawang Industrial Estate, Indonesia's largestindustrial estate. To measure and recognize electricity use in aplace immediately, we use a tool called a smart meter, which ispart of the Internet of Things (IoT), to provide control andoptimization of electricity. Smart meters will operate usingLoRaWAN network connectivity as a LoRaWANcommunication protocol that supports IoT use at a frequency of920-923 MHz using coverage planning and capacity planningusing Forsk Atoll 3.3.2 simulation software. The parameters usedin this study are Spreading Factor (SF) 7, Code Rate (CR) 4/5,Bandwidth 125 kHz, Signal to Noise Ratio (SNR), and ReferenceSignal Received Power (RSRP). We use them to obtain thenumber of gateways needed to optimize the scope of gatewaysfor sending electricity monitoring data to Karawang IndustrialEstate and knowing the value generated from the parametersabove. The simulation of LoRaWAN planning resulted in RSRPwith a mean of-77.94 dBm and a standard deviation of 8.27 dBm.The SNR result has a mean of 13.14 dB with a standard deviationof 9.68 dB……

Time & ID	Presentation
17:00-17:15 **CN012**	Wearable Tool for Breathing Pattern Recognition and Exacerbation Monitoring for COPD Patients via a Device-to-Cloud Communication Model **Dennis A. Martillano**, Malayan Colleges Laguna, Pulo Diezmo, Cabuyao City Laguna 4025, Philippines Abstract— Chronic Obstructive Pulmonary Disease (COPD) has become one of the major causes of disability in the Philippines today. COPD is incurable and would also be one of the most painstaking diseases because it progresses over time. Patient self-monitoring, especially breathing patterns and frequency has become an increasingly recognized process which is beneficial for the ongoing care of COPD. Many potential technologies for the diagnosis and monitoring of COPD have been developed, but focusing on telehealth, imaging, and spirometry. This study has designed and created an IoT based system that could recognize and monitor the respiratory rate through breathing patterns and provide a means for doctors to remotely monitor the patient. The prototype device that has been developed was named X-Hale. X-Hale is a cost-effective and portable remote monitoring IoT-based tool, integrated within a wearable oxygen mask responsible for recognizing and recording accurate breathing frequency patterns. The system was designed to interweave underlying elements of Device-to-Cloud model for a straight-forward communication used in remote monitoring. The wearable device was tested using an HT50 ventilator that delivers machine-controlled dummy breathing in an actual hospital setting. Results show high accuracy in detecting breathing patterns in Slow, Normal and Fast respiratory rate per minute. X-Hale was also tested in actual patients to facilitate the remote monitoring of breathing patterns via the IoT communication model used.
17:15-17:30 **A002-A**	Application of Machine Learning Techniques to Recipe Processing and Analysis **Michal Kazimierz Grzeszczyk**, Warsaw University of Technology, Poland Abstract—The Internet, cookbooks, notes and screenshots are abundant sources of inspiration when preparing a meal. However, it is often difficult to store all recipes in one place and browse them - recipe content cannot be searched easily and images take up too much memory space and are often blurry. Therefore, we present a deep learning method allowing a transformation of recipe images into a serialized, labelled text. Such a created text can be stored in the database for searching purposes and further analysis. Our model is based on Bidirectional Encoder Representations from Transformers (BERT) and classifies blocks of text extracted through Optical Character Recognition into 5 classes: title, description, ingredients, steps and miscellaneous text. It is trained on nearly 80 thousand recipes for which labels are retrieved by web scraping from multiple cooking websites and matched to the text extracted from web pages screenshots. The model achieves 95.04% accuracy on the testing set. Our approach to creating serialised recipe text allows for further recipe analysis. We use a Conditional Random Fields (CRFs) model to extract meta tags of recipe ingredients (quantity, unit, ingredient name etc.). From the meta tags and the recipe structure, the calorific value of the meal can be measured. The analysis of recipes in that manner can help people struggling with obesity or other food related problems find recipes and meals suitable for them. Our solution is integrated into the Chefs' mobile application available on Google Play and Huawei App Gallery and proves the practical utility of the proposed method.

Time & ID	Presentation
17:30-17:45 **A1002**	Construction and Application of Digital Twin Model of Hydropower Plant Based on Data-driven **Lei Zhao**, CEEC Guangdong Electric Power Design Institute Co. Ltd., China Abstract—The digital twin model of hydropower plants is designed to make full use of the massive data information of the new power system, to describe the people, events, things and their relationships in the power system in a digital way, and to provide hydropower companies with effective massive data fusion and mining capabilities. With the development of big data and artificial intelligence technology, digital twin technology is gradually becoming one of the core driving forces to promote the digital transformation of the power industry. The paper expounds the representation method of the digital twin model of hydropower plants, and proposes a data-driven model construction and application framework for the complexity and nonlinear characteristics of the power system. Finally, the effectiveness of the method in this paper is verified by a case of fault diagnosis in hydropower plants.
17:45-18:00 **A013**	Perceptions towards MySejahtera, e-Penjana: Identifying Key Factors **Ser-Jin Chua**, Sunway University, Malaysia Abstract—Hybrid systems are increasingly popular to reduce complexity as well as to integrate the best of diverse options. This paper explores Malaysians' perceptions towards the MySejahtera contact tracing app and e-Penjana, its accompanying e-wallet service provider. Findings highlight that mapping to the Capability Maturity Model and design thinking in MySejahtera-e-Penjana, has led to a needs-based government-citizen communication means and an open/ scalable/extensible supply chain strategy. Analyses using logistic regression and clustering indicate that usefulness, ease of use and social norms are the most important in accepting MySejahtera, and for e-Penjana, convenience, variety and the types of incentives. Consequently, we gather requirements on a healthcare chatbot, to aid/educate the seniors, who may be less tech-savvy. We surmise, for the above apps, data mining can lead to context-aware help, and useful related product recommendations. With additional integration and smart partnerships, it is a testbed for interconnected extensions.

Time & ID	Presentation
18:00-18:15 **CN011**	Development of a Simulated Portable Mesh Network via ESP8266-based devices with Utility Application **Dennis A. Martillano**, Malayan Colleges Laguna, Pulo Diezmo, Cabuyao City Laguna 4025, Philippines Abstract—Mesh network is very effective for node-to-node communications and is more reliable with a longer range. In networks that require and demand devices for home monitoring and control, uncommon topology like Mesh is viewed to have a more effective advantage. However, when it comes to networks, Mesh Network is almost left untouched in most studies simply due to the existing network solutions such as WLAN or Bluetooth. The existence of low-powered WPAN devices such as fill the demand in integrating devices into mesh networks. However, constant configuration could be very complex and difficult for a mesh using existing WPAN devices since nodes constantly move in and out dynamically in the mesh network. This study focused on the development of a simulated mesh network through ESP8266 enabled devices to deliver a straightforward setup and portable connectivity. The study also developed a utility application that integrates an algorithm for node network operations, and a facility that keeps track of mesh network information including delays, node connections, and data transmission. Three(3) portable ESP8266 devices were used in the study. The devices were integrated in a simulated mesh network and subjected to network processes including identity tagging, dynamic connection, routing, and One-way delay and Payload Size Tests. Results of One-Way Delay and Payload Size Tests indicate consistency of transmission and receiving of data of nodes connecting and disconnecting to networks. This can be used as basis in extending further into more high-end nodes like handheld devices and even computers. Similarly, the utilization of dedicated algorithm for Mesh in this study proved that portability can be achieved to avoid loss of connection when nodes abruptly fail in the network.
18:15-18:30 **WB001**	A New Discord Definition and an Efficient Time Series Discord Detection Method Using GPUs **Huynh Thi Thu Thuy**, Ho Chi Minh City University of Technology, Vietnam Abstract—Discord is the most unusual subsequence in a time series. Most of the methods for discord detection in time series belong to the window-based category which uses a sliding window with a pre-specified length. Besides, a discord may appear twice or more times so that any instance of this discord does not qualify to be an abnormal. In addition, computational cost of window-based methods for discord detection is still high. In this paper, we propose a GPU-based parallel method, called KBF_GPU, for time series discord detection with a new definition of discord and no requirement for a pre-specified discord length. With the new discord definition, KBF_GPU can detect exactly the discord in case of there are more than one similar discords in time series. By using GPU programming tech-niques to parallelize Brute-Force algorithm with the new discord definition, our proposed KBF_GPU can run about 10,216 times faster than Brute-Force algo-rithm with the new discord definition on average over seven benchmark datasets.

Time & ID	Presentation
18:30-18:45 **CN001**	Method of Graphical User Interface Adaptation Using Reinforcement Learning and Automated Testing **Victor Fyodorov**, National Center of Cognitive Research, ITMO University, Saint-Petersburg, Russia Abstract—In order to improve the efficiency of image content retrieval, combined with computer vision technology, an intelligent key information detection and recognition system applied to images is proposed. The system is divided into four parts: positioning the text area, detecting key information, recognizing key information and broadcasting voice. Firstly, the image is preprocessed to obtain a clear binary image. Secondly, the dynamic line segmentation algorithm is used to obtain the candidate text areas of the image, and the non-text areas are filtered out with the revelatory rule. Then, the Bayesian classification algorithm is used to discriminate the candidate text region to obtain the key information. Finally, the image of key information is converted into editable text through Optical Character Recognition technology, and the text is converted into speech using text-to-speech conversion technology. The experimental results show that the recognition system of key information is simple and efficient, and the classification accuracy is good, which is suitable for image key information recognition.
18:45-19:00 **CN006**	Development of Online Learning Materials for Tensor Data Processing Exercises **Shota Abe**, Kumamoto College, National Institute of Technology, Koshi, Japan Abstract—Tensor decomposition is used in a wide range of research fields; however, its theory is difficult to understand. Therefore, basic education is essential when using it in programming. Currently, there are few Japanese universities that provide education on tensor decomposition; however, some overseas universities have already conducted it, and online learning materials are also substantial. Therefore, in this paper, we have developed online learning materials for basics and programming exercises of higher-order singular value decomposition (HOSVD), which is one of tensor decomposition, for the purpose of increasing the learning materials for tensor decomposition education. Our learning material is created on Microsoft Teams, and students can access this material channel and work on exercises on demand while watching explanatory videos including CG animation. As a result of the trial of this learning material, it was found that the students who used it can generally understand the processes related to tensor decomposition and can perform basic programming of them.

Time & ID	Presentation
19:00-19:15 **CN013**	Structural Equation Model on Attracting and Catching SCOTINOPHARA COARCTATA using an Alternative Light Trap via Light Emitting Diodes **Dennis A. Martillano**, Malayan Colleges Laguna, Pulo Diezmo, Cabuyao City Laguna 4025, Philippines Abstract—Scotinophara Coarctata (Rice black bugs) pose risk to Philippine agriculture by decreasing rice production. Reducing rice black bugs through pesticides have risks to farmers, therefore, light traps are being used as an alternative to catch the said pest. Different kinds of light are currently being used in traps including vapor, incandescent, UV, and Light emitting diode -based lamps, which pose varying catch index given different attributes. In this study, a LED (Light-emitting diode)-based light trap prototype was used. Rice black bugs had been caught in selected nights between December 2018 to January 2019 in a specific rice field area in the Philippines. Results had been analyzed using the different LED attributes and external factors affecting the catch index. The catch size was treated dependent on attributes including: the onset and offset of the full moon, the different LED colors or wavelengths (white, blue, UV, yellow and green) and the LED illuminance. The relationship between different attributes and factors had been examined and a structural equation model had been defined using different statistical measures to map the relationships. Results of the analyses had shown higher catch index occurs with a higher light intensity regardless of attributes and factors. Results had also shown higher catch with the use of UV type wavelength LEDs, and a strong positive correlation between the wavelength and the offset of full moon. These indicate that an alternative light trap can be further developed using LEDs for attracting rice black bugs with a higher intensity and UV wavelength.

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