# 2021 International Conference on Artificial Intelligence in Information and Communication (ICAIIC 2021)

Jeju Island, South Korea 13 – 16 April 2021



**IEEE Catalog Number: ISBN:** 

CFP21BAD-POD 978-1-7281-7639-0

# Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP21BAD-POD

 ISBN (Print-On-Demand):
 978-1-7281-7639-0

 ISBN (Online):
 978-1-7281-7638-3

### **Additional Copies of This Publication Are Available From:**

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400

Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com





	ession 1A: Information and Communications Technology I / April 14, 202 n Chair: Dr. Riri Fitri Sari (Universitas Indonesia, Indonesia)	09:30 ~ 10:50
2633101	i Chair. Dr. Nii i Turi San (Oniversitas indonesia, indonesia)	09.30 ~ 10.30
1A-1	Coherent Ising Machine Based Optimal Channel Allocation and User Pairing in N Teppei Otsuka, Komei Kurasawa, Zengchao Duan, Aohan Li and Koya Sato (Toky Japan); Hiroki Takesue (NTT, Japan); Kazuyuki Aihara (The University of Tokyo, (NTT, Japan); Mikio Hasegawa (Tokyo University of Science, Japan)	o University of Science,
1A-2	Intrusion Measurement and Detection in LAN Using Protocol-Wise Associative Memory5 Yuwei Sun, Hideya Ochiai and Hiroshi Esaki (The University of Tokyo, Japan)	
1A-3	Deep Learning Based Hybrid Multiple Access Consisting of SCMA and OFDMA Unformation10  Yuta Kumagai, Naoya Gonda, Yukiko Shimbo, Hirofumi Suganuma and Fumiaki Muniversity, Japan)	_
1A-4	Design and implementation of a reference model between services and Al-assisted network	
1A-5	An Energy Efficient Sensor Duty Cycling for Smart Home Networks18  Murad Khan (Kyungpook National University & Sarhad University of Science and Technology, Korea (South)); Junho Seo and Dongkyun Kim (Kyungpook National University, Korea (South))	
Oral S	ession 1B: Al for Image Processing and Multimedia I / April 14, 2021 (W	ednesday)
Session	Chair: Prof. Wen-Cheng Lai (National Taiwan University of Science and Technology, Taiwan)	09:30 ~ 10:50
1B-1	Enhanced Machine Learning-based Inter Coding for WC21  Martin Benjak, Holger Meuel, Thorsten Laude and Jörn Ostermann (Leibniz Universitä)	t Hannover, Germany)
1B-2	Facial Emotion Classification In The Wild Using Bidirectional Convolutional Neur. Jiaxu Liu (26 Barry Drive, Lena Karmel & Australian National University, Austra	
1B-3	Distortion based Watermark Extraction Technique Using 1D CNN31  Yuto Matsunaga, Naofumi Aoki and Yoshinori Dobashi (Hokkaido University, Japa (National Institute of Technology, Tokyo College, Japan)	ın); Tetsuya Kojima
1B-4	Learning to Recognize Masked Faces by Data Synthesis36	

Ziyan Wang (Nanyang Technological University, Singapore); Tae Soo Kim (Johns Hopkins University, USA)

### Oral Session 1C: Al for Data Analysis, Big Data and Cloud I / April 14, 2021 (Wednesday) Session Chair: Dr. Aji Prasetya Wibawa (Universitas Negeri Malang, Indonesia) 09:30 ~ 10:50 1C-1 Differentially-Private Text Generation via Text Preprocessing to Reduce Utility Loss.........42 Taisho Sasada (Nara Institute of Science and Technology & Graduate School of Science and Technology, Japan); Masataka Kawai, Doudou Fall, Yuzo Taenaka and Youki Kadobayashi (Nara Institute of Science and Technology, Japan) 1C-2 Parallelization of Levelset-based Text Baseline Detection in Document......48 Hyeonwoo Jeong (Korea University of Technology and Education, Korea (South)); Ye-Chan Choi (Koreatech, Korea (South)); Kang-Sun Choi (Korea University of Technology and Education, Korea (South)) 1C-3 Min-Max Backpropagation Neural Network to Forecast e-Journal Visitors.......52 Aji P Wibawa (Indonesia & Universitas Negeri Malang, Indonesia); Zahra Nabila Izdihar and Agung Utama (Universitas Negeri Malang, Indonesia); Leonel Hernandez (ITSA University, Colombia & Corporación Universitaria Reformada CUR, Colombia); Haviluddin Haviluddin (Universitas Mulawarman, Indonesia) Learning Human Vehicle Interactions using Simulated Data........59 1C-4 Chuyu Liu (Rensselaer Polytechnic Institute, USA); Tae Soo Kim (Johns Hopkins University, USA) 1C-5 Effects of annotation quality on model performance.......63 Khaled Alhazmi (King Abdulaziz City for Science and Technology, Saudi Arabia & UCSD, USA); Walaa Alsumari (King Abdulaziz City for Science and Technology, Saudi Arabia); Indrek Seppo, Lara

#### Oral Session 2A: Information and Communications Technology II / April 14, 2021 (Wednesday)

Session Chair: Prof. Ohyun Jo (Chungbuk National University, Korea)

Pod and Martin Simon (Marduk Technologies, Estonia)

15:20 ~ 16:40

- 2A-1 Two-Stage Classification Technique for Malicious DNS Identification.........68
  Gabriel Amaizu, Danielle Jaye S. Agron, Jae Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Korea (South))
- 2A-2 High-speed Optimization of User Pairing in NOMA System Using Laser Chaos Based MAB Algorithm.........73

  Zengchao Duan, Norihiro Okada and Aohan Li (Tokyo University of Science, Japan); Makoto Naruse and

  Nicolas Chauvet (The University of Tokyo, Japan); Mikio Hasegawa (Tokyo University of Science, Japan)
- 2A-3 Dynamic Channel Bonding Using Laser Chaos Decision Maker in WLANs.......78

  Hiroshi Kanemasa and Aohan Li (Tokyo University of Science, Japan); Makoto Naruse and Nicolas Chauvet
  (The University of Tokyo, Japan); Mikio Hasegawa (Tokyo University of Science, Japan)



2A-4	A Data Augmented Bayesian Network for Node Failure Prediction in Optical Networks. Dibakar Das (IIITB, India); Mohammad Fahad Imteyaz (Tejas Networks, India); Jyotsna (International Institute of Information Technology, India); Debabrata Das (International Information Technology - Bangalore, India)	Bapat
2A-5	Network Traffic Classification Using Ensemble Learning in Software-Defined Networks Won Ju Eom, Yeong-Jun Song, Changhoon Park, Jeong-Keun Kim, Geon-Hwan Kim and (Kyungpook National University, Korea (South))	
Oral S	Session 2B: Al for Image Processing and Multimedia II / April 14, 2021 (Wedne	esday)
Session	on Chair: Dr. Žiga Emeršič (University of Ljubljana, Slovenia) 15	:20 ~ 16:40
2B-1	Multi-Scale Proposal Regions Fusion Network for Detection and 3D Localization of the Junling Hou, Weihong Li, Weiguo Gong and Zixu Wang (Chongqing University, China)	Infected Trees93
2B-2	SPB-YOLO: An Efficient Real-Time Detector For Unmanned Aerial Vehicle Images99  Xinran Wang, Weihong Li, Wei Guo and Kun Cao (Chongqing University, China)	
2B-3	Online Fall Detection Using Attended Memory Reference Network105  Sunah Min (ETRI, Korea (South)); Jinyoung Moon (Electronics and Telecommunication Research Instittue(ETRI), Korea (South))	
2B-4	Human Sentiments and Associated Physical Actions Detection in Disasters with Deep L Muhammad Sadiq Amin (Tongmyoung University Busan South Korea, Korea (South)); H (Tongmyoung University, Korea (South)); Young-Bok Choi (Tongmyong University, Korea	uynsik Ahn
2B-5	Object Recognition and Distance Extraction System Using Camera114  Yoon Young Jin (University of Kyung Pook, Korea (South))	
Oral S	Session 2C: Al for Data Analysis, Big Data and Cloud II / April 14, 2021 (Wedne	sday)
Session	on Chair: Dr. Bhupesh Mishra (University of Bradford, Uinited Kingdom)	:20 ~ 16:40
2C-1	Bug Report Summarization using Believability Score and Text Ranking117  Youngji Koh and Sungwon Kang (KAIST, Korea (South)); Seonah Lee (Gyeongsang Natio University, Korea (South))	onal
2C-2	Juris2vec: Building Word Embeddings from Philippine Jurisprudence121  Elmer Peramo (Advanced Science and Technology Institute (ASTI), Philippines);  Charibeth Cheng and Macario Cordel II (De La Salle University, Philippines)	
2C-3	Recursive Feature Elimination for Machine Learning-based Landslide Prediction Model Kusala Munasinghe (Sri Lanka Technological Campus & University of Sri Jayewardenep Sri Lanka); Piyumika Karunanayake (General Sir John Kotelawala Defence University, S	pura,

2C-4	Subject Authentication using Time-Frequency Image Textural Features  Turky N. Alotaiby (King Abdulaziz for Science and Technology, Saudi Arabia);  Saleh A. Alshebeili (King Saud University, Saudi Arabia); Gaseb Alotibi (Publ	•
Oral S	ession 3A: Information and Communications Technology III $/$ April	14, 2021 (Wednesday)
Session	Chair: Prof. Mikio Hasegawa (Tokyo University of Science, Japan)	17:00 ~ 18:20
3A-1	Deep Q-learning for 5G network slicing with diverse resource stipulations and dynamic data traffic134 Debaditya Shome (KIIT University, India); Ankit Kudeshia (KIIT University, Bhubaneswar, India)	
3A-2	Analysis on the channel prediction accuracy of deep learning-based approach140 Woo-Sung Son (Kyungpook National University, Daegu, Republic of Korea, Korea (South)); Dong Seog Han (Kyungpook National University, Korea (South))	
3A-3	Machine Learning-Based Service Differentiation in the 5G Core Network144  Mohamad Rimas Mohamad Anfar and Joyce Mwangama (University of Cape Town, South Africa)	
3A-4	RNN Based Optimal Sensing Schedule Control for Wireless Sensor Networks150 Seung-Hee Choi and Sang-jo Yoo (Inha University, Korea (South))	
3A-5	Ego Network-based Virtual Network Embedding Scheme for Revenue Maximization154  Ihsan Ullah, Hyun-Kyo Lim and Youn-Hee Han (Korea University of Technology and Education, Korea (South))	
Oral S	ession 3B: Al for Image Processing and Multimedia III / April 14, 20	021 (Wednesday)
Session	Chair: Prof. Yoonhee Han (Korea Tech. Education Univ., Korea)	17:00 ~ 18:20
3B-1	Fast Temporal Information Retrieval In Videos With Visual Memory160 Jungkyoo Shin (ETRI, Korea (South)); Jinyoung Moon (Electronics and Tele Instittue(ETRI), Korea (South))	
3B-2	A Deep Learning based Scene Recognition Algorithm for Indoor Localization	
3B-3	Recognition of Traffic Signs with Artificial Neural Networks: A Novel Datase Abdulrahman Kerim (Lancaster University, United Kingdom (Great Britain (Hacettepe University, Turkey)	
3B-4	An Approach to Run Pre-Trained Deep Learning Models on Images of Diff Ijaz Ahmad and Seokjoo Shin (Chosun University, Korea (South))	erent Spectral Resolution176
3B-5	Small Object Detection using Context and Attention180  Jeongseon Lim (UST, Korea (South)); Marcella Astrid (University of Science Hyunjin Yoon (ETRI & University of Science and Technology, Korea (South) Telecommunications Research Institute, Korea (South))	



Oral S	ession 3C: Al for Data Analysis, Big Data and Cloud III / April 14, 202	21 (Wednesday)
Session	Chair: Prof. Chaehan So (Yonsei University, Korea)	17:00 ~ 18:20
3C-1	Personlized Education Using Machine Learning Recommendation System.  Ossama Hashem Khamis Embarak (Higher College of Technology & Heriot-Emirates)	
3C-2	Empirical Measurement of Performance Maintenance of Gradient Boosted Decision Tree Models for Malware Detection192  Colin Galen and Robert Steele (Capitol Technology University, USA)	
3C-3	Exploring Meta Learning: Parameterizing the Learning-to-learn Process for Image Classification	
3C-4	An Generational SDE based Indicator for Multi and Many-objective optimization202  Jamshid Yusupov and Vikas Palakonda (Kyungpook National University, Korea (South)); Mallipeddi Rammohan, Mr. (Nanyang Technological University & NTU, Singapore); Samira Ghorbanpour and Kalyana Veluvolu (Kyungpook National University, Korea (South))	
3C-5	Globally Informative Thompson Sampling for Structured Bandit Problems with Application to Crow Transcoding209 Xingchi Liu and Mahsa Derakhshani (Loughborough University, United Kingdom (Great Britain)); Z Zhu (Toshiba Research Europe Ltd, United Kingdom (Great Britain)); Sangarapillai Lambotharan (Loughborough University, United Kingdom (Great Britain))	
Oral S	ession 4A: Al for eHealth and Neuroscience I / April 15, 2021 (Thui	rsday)
Session	Chair: Dr. Michael Tee (University of the Philippines Manila, Philippines)	09:00 ~ 10:20
4A-1	Strabismus Classification using Convolutional Neural Networks215  Donghwan Kim (Korea (South)); Jaehan Joo and Guohua Zhu (Pusan National University, Korea (South)); Jeongbin Seo (PUSAN National University, Korea (South)); Jaeseung Ha and Suk Chan Kim (Pusan National University, Korea (South))	
4A-2	Determining factors contributing to the psychological impact of the COVID-19 Pandemic using machine learning218  Geoffrey A. Solano, Carlos Alfonso V. Palattao, Cherica A. Tee and Michael L. Tee (University of the Philippines Manila, Philippines)	
4A-3	Gene Expression Based Tumor Purity Estimation and Individual-Specific Sur Cutaneous Melanoma224 Marc Jermaine Pontiveros (University of the Philippines Manila & University	

Diliman, Philippines); Joey Mark S. Diaz (University of Leeds, United Kingdom (Great Britain));

Geoffrey A. Solano (University of the Philippines Manila, Philippines)

4A-4	An Efficient Deep Neural Network Binary Classifier for Alzheimer's Disease Classification230 Rukesh Prajapati and Uttam Khatri (Chosun University, Nepal); Goo-Rak Kwon (Chosun University, Korea (South))	
4A-5	Pre-Trained Deep Convolutional Neural Network for Detecting Malaria on the Human Blood Smear Image I Gede Susrama Mas Diyasa and Akhmad Fauzi (Universitas Pembangunan Nasional "Veteran" Jatim, Indonesia) Setiawan (Aviation Polytechnic of Surabaya, Indonesia); Moch. Idhom (University of Pembangunan Nasional "Vete Jawa Timur, Indonesia); Radical Rakhman Wahid and Alfath Daryl Alhajir (Universitas Pembangunan Nasional "Valatim, Indonesia)	
Oral Se	ession 4B: Al for Image Processing and Multimedia IV / April 15, 2021 (Thursday)	
Session	Chair: Prof. Wooyeol Choi (Chosun University, Korea) 09:00 ~ 10:20	
4B-1	An Empirical Comparison of BERT, RoBERTa, and Electra for Fact Verification240  Muchammad Naseer, Muhamad Asvial and Riri Fitri Sari (Universitas Indonesia, Indonesia)	
4B-2	A Design of Learning based Human Positioning Algorithm using Images246  Tae Wan Kim and Dong Myung Lee (Tongmyong University, Korea (South))	
4B-3	Comparison of CNN-based Speech Dereverberation using Neural Vocoder250  Chanjun Chun (Chosun University, Korea (South)); Kwang Myung Jeon and Chaejun Leem (IntFlow Co., Ltd., Korea (South)); Bumshik Lee and Wooyeol Choi (Chosun University, Korea (South))	
4B-4	Multi-View 3D Human Pose Estimation with Self-Supervised Learning254  Inho Chang (Korea Electronics Technology Institute, Korea (South)); Min-Gyu Park and JeWoo Kim (Korea Electronic Technology Institute (KETI), Korea (South)); Juhong Yoon (Korea Electronics Technology Institute, Korea (South))	
4B-5	Deep Iris Feature Extraction257  Andrej Hafner (University of Ljubljana, Slovenia); Peter Peer (University of Ljubljana, Faculty of Computer and Information Science, Slovenia); Žiga Emeršič (University of Ljubljana & Faculty of Computer and Information Science, Slovenia); Matej Vitek (University of Ljubljana, Faculty of Computer and Information Science, Slovenia)	
	ession 4C: Al Applications for Networking and IoT I / April 15, 2021 (Thursday)	
Session	Chair: Prof. Jonathan Pan (Nanyang Tech. University, Singapore 09:00 ~ 10:20	
4C-1	IoT Network Behavioral Fingerprint Inference with Limited Network Traces for Cyber Investigation  Jonathan Pan (Nanyang Technological University, Singapore)	
4C-2	Optimal Partitioning of Distributed Neural Networks for Various Communication Environments	
4C-3	IoT-Based Vibration Sensor Data Collection and Emergency Detection classification using Long Shor Memory (LSTM)272 Cosmas Ifeanyi Nwakanma, Fabliha Bushra Islam, Mareska Pratiwi Maharani, Dong Seong Kim and Min Lee (Kumoh National Institute of Technology, Korea (South))	



4C-4	Q-Learning Approach278  Thong Nhat Tran, Nguyen Toan Van, Kyusung Shim and Beongku An (Hongik Univer	•
4C-5	Integrated System of Vehicle and Passenger Manifests in Port Based on IoT28  I Gede Susrama Mas Diyasa and Akhmad Fauzi (Universitas Pembangunan Nasional "Veteran" Jawa I Jatim, Indonesia); Moch. Idhom (University of Pembangunan Nasional "Veteran" Jawa Ariyono Setiawan (Aviation Polytechnic of Surabaya, Indonesia); Tresna Maulana Fahru Aji Riantoko (University of Pembangunan Nasional "Veteran" Jawa Timur, Indonesia)	leteran" Timur, Indonesia);
Oral S	iession 5A: Al Applications for Mobile Communication / April 15, 2021 (T	hursday)
Session	n Chair: Dr. Toan-Van Nguyen (Hongik University, Korea)	10:40 ~ 12:00
5A-1	A Study on Attack Pattern Generation and Hybrid MR-IDS for In-Vehicle Network  DongMug Kang, Sang Hun Yoon and Dae Kyo Shin (Korea Electronics Technology (South)); Young Yoon and Hyeon Min Kim (Hongik University, Korea (South)); Soo Electronics Technology Institute, Korea (South))	Institute, Korea
5A-2	Controller module implementation to reduce interrupt in CNPC uplink294  Gwonhan Mun (Electrionics and Telecommunications Research Institute, Korea (Sout Tae Chul Hong (ETRI, Korea (South)); Daeho Kim (Korea (South))	uth));
5A-3	Feature-Based Deep LSTM Network for Indoor Localization Using UWB Measurem Alwin Poulose and Dong Seog Han (Kyungpook National University, Korea (South)	
5A-4	DNN-based Wi-Fi Positioning in 3GPP Indoor Office Environment301  Sung Hyun Oh and Jeong Gon Kim (Korea Polytechnic University, Korea (South))	
5A-5	Q-learning based Stepwise Routing Protocol for Flying Ad Hoc Networks306 JaeWon Lim and Young-Bae Ko (Ajou University, Korea (South))	
Oral S	session 5B: Al for Image Processing and Multimedia V / April 15, 2021 (Tl	nursday)
Session	n Chair: Prof. Deepak Mishra (Indian Institute of Space Science & Technology, India)	10:40 ~ 12:00
5B-1	Extensive Huffman-tree-based Neural Network for the Imbalanced Dataset and Its Accent Recognition309  Jeremy Merrill and Yu Liang (University of Tennessee at Chattanooga, USA); Dalei of Tennessee at Chattanooga, USA)	
5B-2	Verbal Abuse Classification Using Multiple Deep Neural Networks315  Hyunju Park (Gwangju Institute of Science and Technology, Korea (South)); Hong K. Institute of Science and Technology (GIST), Korea (South))	ook Kim (Gwa <mark>ngju</mark>
5B-3	Positional estimation of invisible drone using acoustic array with A-shaped neural longsik Ahn and Min Young Kim (Kyungpook National University Korea (South))	network319

5B-4	Volumetric Human Reconstruction from a Single Depth Map324  Ju-Mi Kang (Korea Electronic Technology Institute (KETI), Korea (South)); Juhong Yoon (Korea Electronics Technology Institute, Korea (South)); Minho Lee, JeWoo Kim and Min-Gyu Park (Korea Electronic Technology Institute (KETI), Korea (South))	
	ession 5C: Al Applications for Networking and IoT II / April 15, 2021 (	Thursday)
Session	n Chair: Dr. Yuwei Sun (The University of Tokyo, Japan)	10:40 ~ 12:00
5C-1	Relay Nodes Selection Using Reinforcement Learning328  Haesik Kim (VTT Technical Research Centre of Finland, Finland); Takeo Fujii (The University of Electro-Communications, Japan); Kenta Umebayashi (Tokyo University of Agriculture and Technology, Japan)	
5C-2	Reinforcement Learning for Random Access in Multi-cell Networks334  Dongwoo Lee, Yu Zhao and Joohyun Lee (Hanyang University, Korea (South))	
5C-3	Prioritized-MAC Model for Intelligent UAV-to-BS Communication in Industrial-WSN Systems338 Williams-Paul Nwadiugwu (Kumoh National Institute of Technology & ICT Convergence Research Center, School of Electronic Engineering, Korea (South)); Seung-Hwan Kim, Jae-Min Lee and Dong Seong Kim (Kumoh National Institute of Technology, Korea (South))	
5C-4	Joint Communication and Computing Resource Allocation over Cell-Free Massive MIMO-enabled Mobile Edge Network: A Deep Reinforcement Learning-based Approach343  Fitsum Tilahun (Korea University, Korea (South)); Ameha Tsegaye Abebe (Samsung Electronics, Korea (South)); Chung G. Kang (Korea University, Korea (South))	
Oral S	ession 6A: AI Foundation / April 15, 2021 (Thursday)	
Session	n Chair: Prof. Hirotada Honda (Toyo university, Japan)	13:20 ~ 14:40
6A-1	A novel framework for reservoir computing with inertial manifolds346 Hirotada Honda (Toyo University, Japan)	
6A-2	Sparse Autoencoder for Sparse Code Multiple Access352 Medini Singh, Deepak Mishra and Vani Devi M (IIST, India)	
6A-3	Reverse Engineering the Hamming Code with Automatic Graph Learning Noah B Jacobsen (Mission Solutions Group, Inc., USA)	358
6A-4	Joint Demodulation and Decoding with Multi-Label Classification Using Deep Imtiaz Ahmed (Howard University, USA); Wenjie Xu (Marshall University, USA) (Northeastern University, USA); Wook-Sung Yoo (Marshall University, USA)	
6A-5	A study on the selection of future Al+X promising fields and the direction to stren Jee-Sun Oh (Korea Advanced Institute of Science and Technology, Korea (South	



Oral Se	ession 6B: Al for Energy, Computer Systems and Semiconductor Device / April 15, 2021 (Thursday)	
Session	n Chair: Prof. Seonah Lee (Gyeongsang National University, Korea) 13:20 ~ 14:4	
6B-1	A Method of Delivering Fuel to Telecommunication Exchange Buildings in Disaster Response	
6B-2	Timing diagram for CNPC interleaver implementation on FPGA380  Gwonhan Mun (Electrionics and Telecommunications Research Institute, Korea (South)); Kunseok Kan (ETRI, Korea (South)); Daeho Kim (Korea (South))	
6B-3	CNPC deinterleaver implementation to increase hardware logic utilization on FPGA384  Gwonhan Mun and Hee Wook Kim (Electrionics and Telecommunications Research Institute, Korea (South)); Daeho Kim (Korea (South))	
6B-4	A Deep Learning Module Design for Workspace Identification in Manufacturing Industry389  Jeongsu Kim and Dong Myung Lee (Tongmyong University, Korea (South))	
6B-5	Robust Shared Lateral Control for Driver Vehicle Interaction393  Daijiry Narzary and Subrat Swain (Kyungpook National University, Korea (South)); Jagat Rath (Institute of Infrastructure Technology Research and Management, India); Kalyana Veluvolu (Kyungpook National University, Korea (South)); Hamid Karimi (Politecnico di Milano, Korea (South))	
Oral S	ession 6C: Al Applications for Networking and IoT III / April 15, 2021 (Thursday)	
Session	n Chair: Prof. Joohyun Lee (Hanyang University, Korea) 13:20 ~ 14:4	
6C-1	A Deep Q-Learning Design for Energy Harvesting QoS Routing in Cognitive MANET-IoT Systems4  Nguyen Toan Van, Thong Nhat Tran and Beongku An (Hongik University, Korea (South))	
6C-2	Recognizing human activity using deep learning with WiFi CSI and filtering406 Sang-Chul Kim and Yong-Hwan Kim (Kookmin University, Korea (South))	
6C-3	Principal Component Analysis Implementation for Signal Processing of Electrochemical Impedance Spectroscopy in the Detection of Fake Fingerprints410  Seongsu Park (Ajou University & Realidentity Co., Ltd., Korea (South)); Ki-Hyung Kim (Ajou University Korea (South))	
6C-4	Rain Attenuation Characterization for 6GTerahertz Wireless Communication415  Mohammad Ehatasham Shawon (Khulna University of Engineering & Technology, Bangladesh); Mostaf Zaman Chowdhury (Khulna University of Engineering & Technology, Bangladesh);  Md Biplob Hossen (Khulna University of Engineering & Technology, Bangladesh); Md. Faisal Ahmed an Yeong Min Jang (Kookmin University, Korea (South))	

Fuzzy C-Means Clustering-Based Cooperative mMIMO-NOMA Downlink Communication for 6G Ultra-Massive Interconnectivity.........420
 Md. Shahjalal, Md. Faisal Ahmed, Md. Morshed Alam, Md. Habibur Rahman and Yeong Min Jang (Kookmin University, Korea (South))

#### Oral Session 7A: Al for eHealth and Neuroscience II / April 16, 2021 (Friday)

Session Chair: Prof. Hieyong Jeong (Chonnam National University, Korea)

09:00 ~ 10:20

- 7A-1 Classification of Metastatic Breast Cancer Cell using Deep Learning Approach..........424

  Seohyun Lee, Hyuno Kim and Hideo Higuchi (The University of Tokyo, Japan); Masatoshi Ishikawa
  (University of Tokyo, Japan)
- 7A-2 Consideration of Convolutional Neural Networks for Image Processing of Capillaries.........428

  Hang Nguyen Thi Phuong, Hieyong Jeong and Choonsung Shin (Chonnam National University, Korea (South))
- 7A-3 Classification of diabetic walking through machine learning: Survey targeting senior citizens........434 *Yeoungju Woo, Pizarroso Troncoso Carlos Andres, Hieyong Jeong and Choonsung Shin (Chonnam National University, Korea (South))*
- 7A-4 Low-Cost Real-time Driver Drowsiness Detection based on Convergence of IR Images and EEG Signals.......437

  Kwangju Kim (ETRI, Korea (South)); Kil-Taek Lim (Electronics and Telecommunications Research Institute,

  Korea (South)); Jang Woon Baek (ETRI, Korea (South)); Miyoung Shin (Kyungpook National University,

  Korea (South))
- 7A-5 Deep Learning Based Sentiment Analysis On COVID-19 Public Reviews........443

  Tajebe Tsega Mengistie and Deepak Kumar (National Institute of Technology Meghalaya, India)

#### Oral Session 7B: Al for Control and Decision Systems I / April 16, 2021 (Friday)

Session Chair: Dr. Abduladhim Ashtaiwi (American University of the Middle East, Kuwait)

09:00 ~ 10:20

- 7B-1 Pedestrian Detection System with Edge Computing Integration on Embedded Vehicle.........449

  Ching-Lung Su, Wen-Cheng Lai, and Chun Te Li (National Yunlin University of Science and Technology, Taiwan)
- 7B-2 A Time-aware Data Clustering Approach to Predictive Maintenance of a Pharmaceutical Industrial Plant............453

  Gabriele Calzavara, Eleonora Oliosi and Gianluigi Ferrari (University of Parma, Italy)
- 7B-3 Intelligent Predictive Maintenance Model for Rolling Components of a Machine based on Speed and Vibration.......458
  - Baseer Ahmad (University of West of Scotland, United Kingdom (Great Britain)); Bhupesh Kumar Mishra (University of Bradford, United Kingdom (Great Britain)); Muhammad Ghufran (Abasyn University, Pakistan); Zeeshan Pervez (University of the West of Scotland, United Kingdom (Great Britain)); Naeem Ramzan (University of West of Scotland, United Kingdom (Great Britain))
- 7B-4 ML-Based Localizing and Driving Direction Estimation System for Vehicular Networks..........464

  \*Abduladhim Ashtaiwi (American University of the Middle East, Kuwait)



Oral S	ession 8A: Information and Communications Technology IV / April 16	5, 2021 (Friday)
	Chair: Prof. Mostafa Zaman Chowdhury (Khulna University of Engineering & logy, Bangladesh)	10:40 ~ 12:00
8A-1	Interference Cancellation and Proper Thresholding Using Deep Learning Method in Optical Camera Communication470  Md. Faisal Ahmed, Md. Osman Ali, Md. Morshed Alam and Yeong Min Jang (Kookmin University, Korea (South))	
8A-2	Design of MIMO C-OOK using Matched filter for Optical Camera Communication System473  Huy Nguyen and Yeong Min Jang (Kookmin University, Korea (South))	
8A-3	A New Smart-Meter Data Monitoring System based on Optical Camera Communication476  Md. Osman Ali, Md. Morshed Alam and Yeong Min Jang (Kookmin University, Korea (South))	
8A-4	Big Data Platform for Intelligence Industrial IoT Sensor Monitoring System Based on Edge Computing and Al	
8A-5	Ensemble Classifier Based Modulation Recognition for Beyond 5G Massive MIMO (mMIMO) Communication  Md. Habibur Rahman and Yeong Min Jang (Kookmin University, Korea (South))	
Oral S	ession 8B: Al for Control and Decision Systems II / April 16, 2021 (Frid	ay)
Session	Chair: Prof. Yeong Min Jang (Kookmin University, Korea)	10:40 ~ 12:00
8B-1	A chemicals monitoring and prediction system in semiconductor manufacturi bigdata and artificial intelligence techniques487  Hyung-Min Cho (Healingsoft, Korea (South)); Kyung-Hee Lee (Healingsoft and Bigdat Peter Shim and Anthony Park (SIMMTECH, Korea (South))	
	Teles State and Administration of the Control of th	
8B-2	Optimal Energy Management Strategy for ESS with Day Ahead Energy Predict Yeong Min Jang, Md. Morshed Alam, Md. Faisal Ahmed and Md. Habibur Rahn University, Korea (South))	
8B-2 8B-3	Optimal Energy Management Strategy for ESS with Day Ahead Energy Predict Yeong Min Jang, Md. Morshed Alam, Md. Faisal Ahmed and Md. Habibur Rahm	nan (Kookmin 496