Message from the General Chairs

DigiCon-22

On behalf of the organizing committees, it is our pleasure to welcome you to the 2022 International Conference on Digital Contents (DigiCon-22) will be held in Jeju, Korea, December 19-21, 2022.

DigiCon-22 is the 7th event of the DigiCon conference series which is organized by the DCS (Korea Digital Contents Society) and hosted by the DCS. And this conference was held in conjunction with Special Session KICT-AIWD, Special Workshop KEPRI-DVT&DCS-22, Workshop AICT-2022 and Workshop CooSTEP-SFESE.

We would like to sincerely thank the invited speaker who kindly accepted our invitations, and in this way, helped to meet the objectives of the conference:

- **Prof. Gyu Myoung Lee**, Liverpool John Moores University, UK,
  : Towards Internet of Value: Trustworthy & Decentralized Web 3.0 Platform with AI

DigiCon-22 will be held at Ocean Suites Jeju Hotel, Jeju, Korea. There are numerous local attractions that attendees can enjoy, including:

- **Jeju National Museum,** opened in June 2001, displays 950 pieces out of 7230 collections year round. In the Exhibition room 1 of prehistoric age and archeology are 250 pieces of paleolithic and neolithic artcraft excavated at Gosan-ri.

- **Jungmun Saekdal** Beach is surrounded by steep cliffs that create a cozy and romantic atmosphere. It is situated within the Jungmun Tourism Complex where visitors can enjoy summer vacation by utilizing a variety of entertainment and recreation facilities.

- **Seopji-Koji**, jutting out at the eastern seashore of Jeju Island, is one of the most scenic views with the bright yellow canola and Seongsan Sunrise Peak as a backdrop.

- The **Jeju Shinyoung Cinema Museum** will provide thick nostalgia for everyone, beautiful memories for people in love, and endless dreams for children.

- **Hallim Park** in this multi-faceted park, the palm trees tower along the road. The "Subtropical Garden" greenhouse showcases some rare subtropical plants and the wild plants of Jeju Island.

- **Manjang Cave,** situated at Donggimnyeong-ri, Gujwa-eup, North Jeju, 30 kilometers east of Jeju City, was designated as Natural Monument No. 98 on March 28, 1970. The 7,416-meter long cave has been officially recognized as the longest lava tube in the world.

- **Yongduam,** a rock showing a writhing dragon with a grudge A dragon living in the Dragon Kingdom wanted to ascend to heaven, but it wasn't an easy thing to do.

- **Hangpaduri Fortress** is a National Historical Remains No. 396. This place has a special historical meaning as the special capital defense unit that strongly resisted the invasion of Mongolia until the last possible moment fought from here.

In addition, there are many places to enjoy the traditional Jeju foods such as Galchiguk (Hairtail fish soup), Kkwong-toryeom (Sliced pheasant meat boiled lightly with vegetables), Kkwong-memil guksu (Buckwheat noodles with pheasant meat), Jarihoe (raw damselfish), Jarimulhoe (raw damselfish in chilled -broth), Okdom-gui (Broiled sea bream), Seonggeguk (Sea urchin soup), Jeonbokjuk (Rice porridge with abalone), Obunjagi Kettle Rice, Black Pig Bulgogi Dish, Bingddeok (Bing rice cake) and etc.

Finally, we would like to express our deepest appreciation to the DigiCon-22 Committee and Chairs for their constant supports, invaluable guidance and advice all the time. Thanks to all the volunteers, reviewers, and many people that put extraordinary efforts in this event; we hope you find DigiCon-22 enjoyable and please let us know any suggestions for improvement.

Yoon-Ho Kim (Mokwon University, Korea)

Kuoyuan Hwa (National Taipei University of Technology, Taiwan)

DigiCon-22 General Chairs

Message from the Program Chairs

DigiCon-22

Welcome to the 2022 International Conference on Digital Contents (DigiCon-22)!

The main focus of DigiCon-22 is not only various Smart Media, Arts & Culture Technology based on Digital Contents research issues, but also its coverage can be extended to a wide spectrum of topics related to Digital Contents with AICoM (AI, IoT, Contents and Metaverse) Technology. And DigiCon-22 would be a professional and informative forum for scientists, engineers, experts, professors, and students in the areas of Digital Contents, Information Technology, Computing Technology, Communication & Network, HCI, Business & Management, Intelligent System, IT-based Convergence-Contents Research, and also in multidisciplinary or interdisciplinary research fields.

During the last decade, many countries have adopted in recent years roadmap for developing the future infrastructure in emerging digital contents technology areas such as Artificial Intelligence, IoT, digital contents, Metaverse, arts & culture technology convergence, smart media, mobile technology, and ICT applications technology. Our special interest lies in both theoretical and practical research contributions presenting new techniques, concepts, or analysis reports on experiences and experiments of implementation. Also, we are interested in application of theories, and tutorials on new technologies and trends in various digital contents/services areas and in all relevant science and engineering areas.

In DigiCon-22, we received many submissions that have conducted blind review by at least two reviewers of the technical program committee that consists of leading researchers around the globe. We finally selected 43 papers and special presentations in total. All selected papers will be included in the conference proceedings published by DCS Korea Digital Contents Society). Without the reviewers'' hard work, achieving such a high quality of proceedings would have been impossible. We take this opportunity to thank them for their great support and cooperation.

Finally, we would like to thank you all for your participation in our conference and thank all the authors and organizing committee members.

Thank you for your great collaboration and enjoy the conference!

Young-Ae Jung, Sun Moon University, Korea

Yangsun Lee, Hanshin University, Korea

Chun-Feng Liao, National Chengchi University, Taiwan

DigiCon-22 Program Chairs

Conference Organization

DigiCon-22

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Min-Woo Cheon (Dongshin University, Korea)

Message from the Workshop Chairs

Workshop on KEPRI DVT&DCS-22

Welcome to the 2022 International Workshop on Development of Visualization Technology and Digital Contents for Smart Safety Solution(DVT&DVS), which will be held 19 December, 2022 in Jeju, Korea.

The Workshop Session Smart-Safety mainly focus on new technology such as risk index measurement, human health index dealing, deep learning ensemble AI model, mobility edge computing and IoT smart sensor. This workshop aims at providing insights into the human danger situation posed by electric work field, especially in match to ISO 45001 global standard. We believe this workshop will be a place to help the research community to define their novel ideas in the current state of smart-safety issues. Actually, the DVS&DCS-22 is the next event, in a series of highly successful International Workshop on DigiCon-22.

We would like to thank the conference general chairs Director Jung-Wook Woo and Director Jae-Ju Song. Many thanks also to all the members of the Organizing Committee for their full support in preparation of the conference.

Finally, we would like to thank all the authors for their continuing support by submitting their original contributions to this workshop. We look forward to meeting you in person at Jeju island, and hope that you will enjoy the special experience of the program.

Jung-Wook Woo, Research Director, KEPCO Research Institute, Korea

Jae-Ju Song, Research Director, KEPCO Research Institute, Korea

General Chairs

Dong-Yeop Lee, Senior Researcher, KEPCO Research Institute, Korea

Chang-Hun Chae, Senior Researcher, KEPCO Research Institute, Korea

Jae Myeong Choi, Professor, Mokwon University, Korea

Program Chairs

Message from the Workshop Chair

Workshop on AICT-2022

Welcome to the AICT-2022 Workshop and DigiCon-2022!

This international workshop focuses on Culture Contents & Art with AICT. That contain XR content-based research, AI and ICT technology for culture contents, applied convergence applications for metaverse. Artificial intelligence technology and state-of-the-art ICT technology in the metaverse environment are now essential to provide immersion to users with the required quality of experience(QoE) and serve immersive contents. In This international workshop, we introduce recent advances in research and innovation based on artificial intelligence and ICT in metaverse systems, XR cloud computing, 3D graphic technology, and metaverse networking for culture contents and art. We aim to publish the latest and most technically sound research articles demonstrating theoretical and practical contributions to high-performance intelligent metaverse platforms, enlarged ICT technology, advanced network approaches, and immersive 3D graphic technology.

Diverse topics of the AICT-2022 workshop are Digital Contents & Media Processing, Smart e-Learning, e-Commerce and Applications, Digital Arts, AR, VR Technology & Applications, Smart Media & Mobile Technology, Applied computer vision for XR content, Metaverse platform QoS/QoE analysis and evaluations, Simulation and tracking technology for VR/AR/MR, Deep learning approaches for XR content processing, and AI for processing immersive contents and new media.

In AICT-2022, we received many submissions that have conducted blind reviews by at least two reviewers of the technical program committee comprising leading researchers around the globe. We finally selected 11 papers and special presentations in total. All selected papers will be included in the conference proceedings published by DCS Korea Digital Contents Society). Without the reviewers" hard work, achieving such a high quality of proceedings would have been impossible. We take this opportunity to thank them for their tremendous support and cooperation.

Finally, we would like to thank you all for your participation in our workshop and thank all the authors and organizing committee members.

Thank you for your great collaboration and enjoy the conference!

Jinsul Kim, Chonnam National University, Korea

AICT-2022 Workshop Chair

Message from the Workshop Chair

2022 International Workshop on CooSTEP-SFESE

Welcome to the 2022 International Workshop on SFESE, which will be held 19-21 December, 2022 in Jeju, Korea.

As the era of the 4th Industrial Revolution begins, it is time to build an education-oriented social enterprise that pursues corporate social values and economic benefits through the creation of shared values. SFESE((smart farm & Education-oriented Social Enterprise) workshop aims to provide insight into how education-oriented social enterprises develop smart farm-related h/w and s/w technologies and produce them as content.

As the first theme, this workshop designed an education-oriented social enterprise model as a way to overcome educational asymmetry, and analyzed the concept of social enterprises and the role and strategy of social economic organizations. The establishment of social enterprise aiming for the development, distribution, and education of ICT-based diversity education contents by education experts can be an appropriate alternative.

The second theme is the process of designing a smart farm, which develops all actual products and solutions linked to ICT practical education, and produces the development process and results as practical education contents. It will be a very desirable business model if prospective technicians who have taken the training of developed smart farm products can purchase and use them directly in the industrial area they want to work in the future.

We would like to thank the conference general chair Prof. Yoonho Kim and program chair Prof. Youngae Jung. Many thanks also to all the members of the Organizing Committee for their full support in preparation of the conference.

Finally, we would like to thank all the authors for their continuing support by submitting their original contributions to this workshop. We look forward to meeting you in person at Jeju island, and hope that you will enjoy the special experience of the program.

Sangjun Byun, Daeduk University, Korea

CooSTEP-SFESE Workshop Chair

Invited Talk

Prof. Gyu Myoung Lee

Liverpool John Moores University, UK

About Prof. Gyu Myoung Lee

Gyu Myoung Lee joined the Liverpool John Moores University (LJMU), UK in 2014, as Senior Lecture in the department of Computer Science and was promoted to a Reader in 2017 and a Professor in 2020. He is also with KAIST Institute for IT convergence, Daejeon, Rep. of Korea, as an Adjunct Professor from 2012.

Before joining the LJMU, he worked with the Institut Mines-Telecom, Telecom SudParis from 2008. Until 2012, he was invited to work with the Electronics and Telecommunications Research Institute (ETRI), Rep. of Korea. He worked as a research professor in KAIST, Rep. of Korea and as a guest researcher in National Institute of Standards and Technology (NIST), USA, in 2007. He worked as a visiting researcher in the University of Melbourne, Australia, in 2002. Furthermore, he also has work experiences in industries in Rep. of Korea.

His research interests include Internet of Things, digital twin, computational trust, blockchain with privacy preserving, data and AI governance, knowledge centric networking and services considering all vertical services, Smart Grid, energy saving networks, cloud-based big data analytics platform and multimedia networking and services.

Prof. Lee has been actively participating in standardization meetings including ITU-T SG 13 (Future networks and cloud) and SG20 (IoT and smart cities and communities), IETF and oneM2M, etc., and currently serves as a Working Party chair and the Rapporteur of Q16/13 (Future Networks: Trustworthy and Quantum Enhanced Networking and Services) and Q4/20 (Data analytics, sharing, processing and management, including big data aspects, of IoT and SC&C) in ITU-T. He is the Vice-Chair of ITU-T FG-AN and FG-AI4A as well as the Convenor of CG-AIoT. He was also the chair of ITU-T Focus Group on Data Processing and Management (FG-DPM) to support IoT and smart cities & communities. He has contributed more than 450 proposals for standards and published more than 190 papers in academic journals and conferences. He received several Best Paper Awards in international and domestic conferences and served as a reviewer of IEEE journals/conference papers and an organizer/member of committee of international conferences. He is a Senior Member of IEEE.

Prof. Lee received his BS degree in electronic and electrical engineering from Hong Ik University, Seoul, Rep. of Korea, in 1999 and MS, and PhD. degree from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Rep. of Korea, in 2000 and 2007, respectively.

Title : Towards Internet of Value: Trustworthy & Decentralized Web 3.0 Platform with AI

Artificial Intelligence (AI) and Internet of Things (IoT) are very important technologies for the future and recently there are a lot of research activities to combine AI and IoT, called AIoT (Artificial Intelligence of Things). Furthermore, data is becoming essential to support AI based solutions with human interactions. Blockchain revolutionizes how transactions are recorded as a machine for creating trust. In this regard, this talk introduces key concepts, features, and characteristics of the new Internet (Web 3.0 and its vision as Internet of Value) considering emerging ICTs integrating AIoT and blockchain. From Web 3.0 research, many researchers have identified that there are security, privacy, and trust concerns to realize user-centric Internet platform. To cope with negative effects of the new Internet, so called Web 3.0, environment for digital economy, it's necessary to address trustworthy and decentralized platform. Therefore, from new economic paradigm for cyber spaces, data ecosystem and its features, this talk introduces key challenges for realizing the decentralized platform with trust technology and discuss next steps for future research.

PROGRAM SCHEDULE

December 19, 2022 (Monday)	
09:00- 10:00 -	**Local Arrangement Meeting** Chair: Ki-Hong Park
10:15- 11:15	**DCS & DigiCon-22 Steering Meeting** Chair: Young-Ae Jung
11:30- 12:30	**DigiCon-22 Conference Committee Meeting** Chair: Yang-Sun Lee
12:30- 13:30	**Lunch**
13:30-	**Registration** **Ocean Suites Jeju Hotel, 2nd Floor**
14:00- 17:00	**Session W-1 : KEPRI DVT&DCS-22** **KEPRI Workshop on the Development of Visualization Technology and Digital Contents for Smart Safety Solution** Chair: Dong-Yeop Lee **Canola Hall**
16:00- 17:00	**Special Session S-1 : KICT-AIWD** **Special Session on Water Disaster (Road Inundation) Response Strategy using AI** Chair: Hui-Seong Noh **Cherry Hall**
17:20- 18:00	**DigiCon-22 Committee & DCS Meeting** Chair: Jae Myeong Choi **Cherry Hall**

1. A paper presentation should be made by one of authors of the paper, during a 20 minute time slot (15 minutes for the presentation itself and 5 minutes for Q/A).

2. All speakers of each session should meet the session chair at its room 10 minutes before the session begins.

December 20, 2022 (Tuesday)	
10:30	**Registration** **Ocean Suites Jeju Hotel, 2ⁿᵈ Floor**
11:00 - 12:00	**Session P-1** Chair: Mucheol Kim **Cherry Hall**	**Session P-2** Chair: Ki-Hong Park **Canola Hall**
12:00- 13:00	**Lunch** **BlueOcean (2nd Floor)**
13:00 - 14:00	**Session A-1** Chair: Ka-Lok Man **Cherry Hall and Online Zoom Meeting Room** *Please Check the Zoom login detail* *to be provided later.*	**Session A-2** Chair: Young-Ae Jung **Canola Hall and Online Zoom Meeting Room** *Please Check the Zoom login detail* *to be provided later.*
14:00- 14:20	**Coffee Break**
14:20 - 15:20	**Closed Session**	**Session B-1** Chair: Hyoseok Yoon **Canola Hall**
15:30 - 16:30	**Session W-2 : AICT-2022** **<Hybrid Session>** Chair: Seungwon Kim **Cherry Hall and Online Zoom Meeting Room** *Please Check the Zoom login detail* *to be provided later.*	**Session B-2** Chair: Jaechoon Jo **Canola Hall**
16:40- 17:30	**Session W-3 : AICT-2022** **<Hybrid Session>** Chair: Jin Sul Kim **Cherry Hall and Online Zoom Meeting Room** *Please Check the Zoom login detail* *to be provided later.*	**Invited Talk** ***Towards Internet of Value: Trustworthy &*** ***Decentralized Web 3.0 Platform with AI*** by Prof. Gyu Myoung Lee , Liverpool John Moores University, UK Chair: Young-Ae Jung **Canola Hall and Online Zoom Meeting Room**
18:30 – 20:30	**Conference Banquet** ***(with Best Paper Award Ceremony)*** **Canola Hall** Chair: Hye Young Lim

1. A paper presentation should be made by one of authors of the paper, during a 20 minute time slot (15 minutes for the presentation itself and 5 minutes for Q/A).

2. All speakers of each session should meet the session chair at its room 10 minutes before the session begins.

December 21, 2022 (Wednesday)	
10:30-	Registration (Ocean Suites Jeju Hotel, 2nd Floor)
11:00-12:30	**Session W-4 : CooSTEP-SFESE** Chair: Sangjun Byun **Cherry Hall**	**Session B-3** Chair: Yangsun Lee **Canola Hall**
12:30-13:00	**Closing Conference** **DigiCon-22 Committees & DCS Meeting** Chair: Young-Ae Jung	

1. A paper presentation should be made by one of authors of the paper, during a 20 minute time slot (15 minutes for the presentation itself and 5 minutes for Q/A).

2. All speakers of each session should meet the session chair at its room 10 minutes before the session begins.

TECHNICAL SCHEDULE FOR DIGICON-22

Monday, December 19

09:00 - 10:00   Local Arrangement Meeting

Chairs: Ki-Hong Park (Osan University, Korea)

10:15 - 11:15   DCS & DigiCon-22 Steering Meeting

Chairs: Young-Ae Jung (Sun Moon University, Korea)

11:30 - 12:30   DigiCon-22 Conference Committees Meeting

Chair: Yang-Sun Lee (Hanshin University, Korea)

13:30 -   Registration open (2nd Floor)

2nd Floor, Ocean Suites Jeju Hotel

14:00 - 17:00   Workshop Session W-1 : KEPRI DVT&DCS-22

Room: Canola Hall
Chair: Dong-Yeop Lee (KEPRI, Korea)

Development of Visualization Technology and Digital Contents for Smart Safety Solution

Dong-Yeop Lee (KEPCO Research Institute, Korea)

[Abstract] Development of KEPCO-specialized safety system in response to government safety policy and autonomous safety solution for worker safety and health management based on risk assessment. The autonomous safety solution aims to digitize standard work procedures through risk assessment based on KEPCO's specialized safety management system that meets the standards of ISO45001. This is a technology that can autonomously judge the safety situation

AI-based Safety Judgment Engine

YongSuk Chang (DAOOLDNS Co., Ltd., Korea)

[Abstract] Development of immediate judgment/prediction solution for worker risk situation using RI(Risk Index)/BI(Biological Index)/image-based composite AI model. It uses deep learning ensemble models and provides highly accurate models based on automatic annotation tools. Ensemble technique is used to improve prediction of AI model. Classification through ensemble learning uses a technique of deriving a more accurate final prediction by learning several models to create each classifier and combining each prediction result at once. An ensemble model is easy to create a learning model with excellent predictive performance in the field of classification or regression of structured data.

GIS based worker safety management visualization design

DaeHyeon Lim (AGICS Co., Ltd., Korea)

[Abstract] The autonomous safety solution places GIS in the main and at the same time implements an intuitive dashboard that focuses on providing data so that major inspections and notifications can be checked. In addition, it is designed to converge and apply various smart technologies and IoT-related communication technologies, and to enable smartization of the safety management process, guarantee of safety quality, and integrated data control monitoring through various analysis methods such as control and reporting.

Worker safety big-data management

YeongJae Choi (NTELS Co., Ltd., Korea)

[Abstract] This study defines a module for ETL (Extract, Transform, Load)-based data processing and interfacing, and a module for real-time image streaming and storage. We present a method for collecting BI (biometric information) and worker images and a method for linking with N mobility gateways to collect them. In this study, the module for collecting BI (biometric information) is loaded into Hadoop through Nifi and Kafka, and Nifi, Kafka, and Hadoop are designed in a structure that enables distributed processing through a cluster.

Design and Implement Mobility Gateway for Safety-Field

Sunghwan Kang (Dain Lab Co., Ltd., Korea)

[Abstract] In this study, an architecture with suitable specifications for driving the executable file of the RI/BI/image composite AI model (judgment/prediction) was designed and the AI model was loaded. Wired and wireless communication interfaces were designed, including LoRaWAN R1.0.2 or higher, in consideration of link scalability of low-power sensor devices. We designed a sensor device considering the sensor selection and attachment location for measuring the biometric information of field workers. The sensor device was designed with an AIoT-based AI pre-processing algorithm to pre-process the measured biometric information in the smart sensor device. A sensor time synchronization protocol was developed to synchronize the data acquisition point time between the system and the sensor device, and provided an accurate synchronized time.

XR Technology in Electric Power Field

Changhoon Chae (KEPCO Research Institute, Korea)

[Abstract] We introduce the VR trend in the field of Electric Power Field. A prototype of visualization for power system and management of power facilities in virtual space. A Simulation of solar-energy, wind-power production according to weather condition. Virtual training for inspecting on power facilities(Transmission tower) using a drone. Training for inner structure, construction and inspection of major distribution facilities in VR. Experience on operation princile, inner structure, construction and failure mode of Transformer, Seitch, Circuit breaker, Manhoe, etc. The XR is used for education on power substation mechanism and inspecting process also.

16:00 - 17:00   Special Session S-1 : KICT-AIWD

Room: Cherry Hall

Chair: Hui-Seong Noh (KICT, Korea)

Development of AI-based road Inundation real-time prediction, monitoring and operation technology

Hui-Seong Noh, Cheon-Kyu Choi (Korea Institute of Civil Engineering and Building Technology (KICT), Korea)

[Abstract] Flood damage is increasing as the frequency and intensity of torrential rains and typhoons increase due to global warming. In particular, in terms of road flooding, it is necessary to shift away from the post-processing system centered on 'recovery-compensation' to a proactive disaster response system through 'prevention-response-management'. This study aims to solve local issues related to flood damage targeting Jinju-si, Gyeongsangnam-do, with 'real-time road flood prediction, monitoring and operation technology', which can be the foundation technology for road flood-related disaster policies. It consists of empirical studies that combine various technologies such as flood analysis using rainfall prediction data, AI-based real-time monitoring using CCTV images, flood information based on spatial big data, and e-SOP.

Development of AI-based Spatio-Temporal Inundation Detection Algorithm

Cheon-Kyu Choi, Hui-Seong Noh (Korea Institute of Civil Engineering and Building Technology (KICT), Korea)

[Abstract] In this study, we developed a spatio-temporal road flood detection algorithm that can simultaneously analyze road CCTV images in time and space for real-time road flood monitoring using CCTV. For road flooding, not only the spatial information of fragmentary images but also the information that appears over time must be considered. In this study, firstly, we build road CCTV learning data for road flooding situation discrimination, secondly, we develop a learning data preprocessing module, ViViT, and Hybrid AI model, respectively, and finally, we build a learning and inference pipeline. Classification accuracy for daytime and nighttime images was confirmed.

Development of Road Flooding Risk Assessment System

Yonsoo Kim (LIG Suystem Co., Ltd., Korea), Hui-Seong Noh (KICT, Korea)

[Abstract] Road flooding caused by natural disasters(heavy rain, typhoon) affects not only life and property damage, but also social and economic sphere, such as paralysis of urban functions due to traffic control and restrictions on logistics movement. In this study, proposes a the method of risk assessment so that local governments can minimize damages of road flooding caused by natural disasters(heavy rain, typhoon) and to establish systematic disaster prevention measures. To this end, the risk assessment of road flooding consists of four main factors(hazard, exposure, vulnerability, reduction). These factors are evaluated in terms of disaster indicators for probability, consequentiality, vulnerability, and reducibility, respectively. The evaluation criteria for hazard and exposure were prepared by analyzing the occurrences and damages of road flooding in the last 24 years by local governments. And, based on available statistical data for each local government, demographic, social, and facility indicators are selected for vulnerability factors, and medical, policy and administrative indicators that are reduction factors are selected. The risk assessment of road flooding for local governments was derived through the evaluation results of each risk assessment factor.

Error analysis of Area Mean Precipitation according to Spatial Interpolation Method

Seokhwan Hwang, Narae Kang, Jungsoo Yoon (Korea Institute of Civil Engineering and Building Technology (KICT), Korea)

[Abstract] *In the field of water resources, area mean precipitation is used in various fields such as ground observation data in unit of location, mean area data production of climate statistics data, and flood forecasting. As such, it is very important to accurately estimate area mean rainfall. Area-mean rainfall is predominantly influenced by the spatial distribution of observation networks along with the density of rainfall observation networks in the target watershed, and errors may occur accordingly. In this study, when estimating the regional mean rainfall using the spatial interpolation method, the uncertainty due to the influence of the basin size and the density of the rainfall meter was quantitatively evaluated. We intend to provide guidelines for the placement and observation of rain gauges.*

17:20 - 18:00   *DigiCon-22 Committee & DCS Meeting*

Room: Canola Hall

Chair: Jae Myeong Choi (Mokwon University, Korea)

Tuesday, December 20

10:30 -   *Registration open (2nd Floor)*

2nd Floor, Ocean Suites Jeju Hotel

11:00 - 12:00   *Session P-1*

Room: Cherry Hall

Chair: Mucheol Kim (Chung-Ang University, Korea)

Basic Research to Improve the Curriculums of the Artificial Intelligence Convergence Education Major

Hyojoo Woo, Hyunsu Lee, Jaechoon Jo (Hanshin University, Korea)

[Abstract] This study aims to suggest measures to improve the curriculums of the AI Convergence Education Major by analyzing the AI Convergence Education Major curriculums of 40 graduate schools in Korea. There was a difference in the curriculums of 40 graduate schools that operate the AI Convergence Education Major, and there was also a huge gap in the number of courses. This raised the need to define the AI Convergence Education Major and organize a standardized curriculum by consistently improving the curriculum of each graduate school based on the meaning of the AI Convergence Education Major.

Ablation Study of Multi-Task Learning for Speech Emotion Recognition

Jiyoung Seo, Bowon Lee (Inha University, Korea)

[Abstract] Multi-talk learning for speech emotion recognition has been popularly used as an effective method to address the overfitting problem caused by the lack of large datasets. Multi-task learning divides the tasks into primary task and multiple auxiliary tasks and train the model altogether. Although the performance improvement with the use of multi-task learning has been reported in the literature, the contributions of the auxiliary tasks have not been well studied. This paper presents the results of the contributions of the auxiliary tasks through an ablation study to identify which tasks are more effective than others using the Conformer model and multi-feature combination for categorical speech emotion recognition.

Social Skills Training in the Metaverse : Creating Virtual Social Space for Adults with ASD

Jusung Kim, Yunha Park, Youngsun Lee (Ewha Womans University, Korea)

[Abstract] This study proposes a contactless social skill training program to support social interaction and communication for adults with autism spectrum disorders. From an analysis of the existing program, the contents of the training program are organized to fit into a contactless environment. This study presents the social skill training program implementation system focused on the composition of modules, critical points of video content development, metaverse platform selection, and organization of its environment.

Vehicle Digital Forensics: Focusing on In-Vehicle Infotainment System

Sungbum Kim, Geon Yu, Taeshik Shon (Ajou University, Korea)

[Abstract] As the concept of a smart car appears with the development of network technology, users can use convenient services in the car. Accordingly, the car is connected to the cloud server and mobile device centering on the vehicle infotainment system to generate and store various user-related data. Since these data can be used as key evidence in the event of a vehicle-related crime, digital forensic research on vehicle infotainment systems is needed. Therefore, in this paper, three components in a vehicle that can acquire data are identified, and a digital forensic analysis research direction according to each component is proposed.

Ocular and Musculoskeletal Changes in the University Students using Digital Gadgets

Hyojin Kim, Sujin Hwang (Baekseok University, Korea)

[Abstract] University students have been spending an increasingly longer time staring at digital screen electronic devices to take e-learning. This study aimed to investigate the effect of the types of digital screen electronic devices on eye and musculoskeletal conditions in university students during the e-learning environment. A total of 200 college students were enrolled in this study. They conducted an online survey to examine the effects of the types of digital screen electronic devices on eye and musculoskeletal conditions during e-learning environment. The questionnaires consisted of four sections: demographic and general information, device-related factors, and visual display terminal (VDT) syndromes. Eye fatigue and neck, shoulder, and back pain was significantly different among digital screen devices. The mean VDT syndromes score was significantly influenced by daily exercise, daily hours of electronic device use, and digital gadgets. The results of this study showed that university students taking online classes during e-learning suffered more from VDT syndromes, especially in eye fatigue and neck, lower back, and shoulder pain. This study suggests that it is necessary to take breaks in online classes and regularly provide appropriate eye exercise and physical activity to prevent VDT syndromes.

11:00 - 12:00   *Session P-2*

Room: Canola Hall

Chair: Ki-Hong Park (Osan University, Korea)

Comparison of Speech-To-Text APIs of Korean of People With Autism

Suyeon Yoon, Bowon Lee (Inha University, Korea)

[Abstract] In this paper, we compared the performance of the two commonly used Korean speech-to-text APIs for a person with autism. The APIs selected for the experiments are Naver's Clova API and ETRI's STT API. The experimental results show that both of these two APIs show significant differences for the results of a person with or without autism. Furthermore, the results show that Naver's Clova API shows superiority for autism data compared with ETRI.

Analysis of mobile apps in social and communication skills for children with autism spectrum disorder

Hwan-Hee Kim, Seok-Jeong Yeon (Inha University, Korea), Ki-Hyung Hong (Sungshin W. University, Korea)

[Abstract] The purpose of this study is to systematically analyze mobile apps developed to improve the social and communication skills of children with ASD. A total of 37 apps were selected according to specific criteria, and the learning type of apps, functional and learning characteristics of the apps were analyzed.

Forensic methodology according to the cyber terrain in cyber space

Minju Kim, Jino Lee, Taeshik Shon (Ajou University, Korea)

[Abstract] Russia's invasion of Ukraine in 2022 is not only a non-cyber war, but also a cyber war. Both countries carried out data theft using deepfake technology, transmission of phishing emails, and DDoS attacks as cyberattacks. The cyber battlefield refers to the terrain in which cyber operations are conducted. Cyber topography is defined as entities such as devices, data, software, and networks that make up cyberspace. As attacks on cyber battlefields increase more than attacks on non-cyber battlefields, forensics on cyber battlefields are needed when an attack is attempted on cyber battlefields. When an attack is attempted or performed on the cyber battlefield, it is necessary to analyze the attack through forensics. Therefore, this paper divides the cyber battlefield into five layers (persona layer, cyber persona layer, logical layer, physical layer, and geographical layer) and proposes a forensic method that can be performed in each layer.

A Template Application for Practicing Social Interactions Using the Causality Protocol

Taein Kim, Bowon Lee (Inha University, Korea)

[Abstract] This paper proposes a template application that users can virtually practice social interactions with digital content. The content used in the application is written with the Causality protocol from previous research, designed for the rapid development of HCI applications. Therefore, the programmer developing a similar application can effectively implement the required features by referring to or utilizing this template application. Furthermore, the scenario creator can only concentrate on making the content itself without learning programming knowledge. This paper also introduces a study that has been conducted with an intervention study with volunteers using the template application, which proves that the proposed template application can contribute to obtaining meaningful results in other studies.

12:00 - 13:00   *Lunch*

BlueOcean (2nd Floor)

13:00 - 14:00   *Session A-1*

Room: Cherry Hall

Chair: Ka Lok Man (Xi'an Jiao Tong-Liverpool University, China)

Development of pets health condition management service

HaeKyung Chung (Konkuk University, Korea), JangHyok Ko (Sahmyook University, Korea)

[Abstract] *In this study, the health status of pets can be checked simply through the application, and even if the user does not recognize the health status of the pets, it detects the health condition of the pets in real time and detects the health condition and sends it to the specialist in charge. It is a service that can be announced. Considering the health condition of the pets in which the abnormality has occurred, it is possible to provide information about veterinary hospitals currently available for treatment and treatment with conditions for treatment and treatment, and information on pharmacies equipped with medicines for pets. Furthermore, it is possible to perform defecation analysis and emotion analysis based on the collected activity information. For example, by analyzing the state and color of defecation in the image collected in the activity information, it is possible to predict the health state information of the pets. It is possible to judge the health of the pets by looking at the image of defecation on the toilet pad or floor of the pets and analyzing the condition and color of the bowel movement through the image analysis algorithm. In addition, it is possible to infer the pets' emotions based on the pets' barking and crying sounds. In this study, firstly literature study was conducted to understand overall understanding of service and completed persona through survey methods such as in-depth interviews. The user's goal was simple, easy to operate the application.*

North Korea's IT Evolution and Reality

Hyunguk Ryu (Tsukuba University of Technology, Japan)

[Abstract] *New communication methods are emerging in North Korea, and new digital lifestyles are spreading. This will also be essential for future cooperation and exchanges between South and North Korea. We briefly examined North Korea's IT sector development strategy, communication Internet, intranets, smartphones, tablets, and the status of various apps. In the era of Chairman Kim Jong-un, various technological and service developments are being made based on IT personnel fostered through the existing IT education system. Recently, as the spread of mobile communication expands, various apps and other services have been provided, and the smartphone ecosystem is rapidly developing. Interestingly, the use of official informal social media accounts is quickly increasing concerning the use of intranets in North Korea.*

Dynamic Pricing Strategies on the Internet

Yuchen Liu, Ka Lok Man (Xi'an Jiao tong-Liverpool University, China), Gangmin Li (University of Bedfordshire, UK), Terry Payne (University of Liverpool, UK), Yong Yue (Xi'an Jiao tong-Liverpool University, China)

[Abstract] *Pricing on the Internet is becoming more dynamic due to low menu costs and easy access to competitors' information, allowing different pricing strategies to respond to environmental change. There are many pricing strategies currently in practice in web commerce. It is difficult to grasp the various applications quickly. This paper presents a "5+1" categorisation of pricing strategy. With different strategies explicitly revealed, our "1+5" model includes a traditional strategy that directly changes posed prices and five novel pricing strategies to adjust prices invisibly in the background. A comparison is provided to show their differences and similarities.*

13:00 - 14:00   *Session A-2*

Room: Canola Hall

Chair: Young-Ae Jung (Sun Moon University, Korea)

Deep Learning Based 3D-Stacked Memory Architecture

Qinyu Zhu, Kamran Siddique (Xiamen University Malaysia, Malaysia), Xianbin Hong, Ka Lok Man (Xi'an Jiao tong-Liverpool University, China)

[Abstract] *Memory bandwidth, capacity, as well as latency have been proved to cause a significant decreased performance and more performance and storage are being integrated in computing devices, which require more data transfer between processor and system memory. Therefore, in this paper, we carry out our proposed 3D-stacked memory architecture in detail to overcome this situation. 3D-stacked memory architecture can be seen as an alternative way to resolve the performance issues as it provides a high frequency memory-bus medium, which enables stacking of volatile memory such as DRAM directly on a microprocessor. We firstly look into how 3D-stacked memory architecture can overcome these problems. We then investigate how 3D-stacked memory architecture can be integrated into In-memory computing and the future of DRAM.*

Implementation of Geofencing Algorithm for in Flood Disaster

Hyonjun Kang, Mucheol Kim (Chung-Ang University, Korea)

[Abstract] *Disasters are defined as damage in human and resources caused by natural, social accidents which are over a certain scale. Flood disasters encompass natural accidents such as flooding, overflow, landslides, and social accidents caused by waterworks. Recently, disasters are increasing globally, and flood disasters are counted most of the type of disasters. The prevention and response on disaster is the mainstream task for disaster studies. This paper proposes a novel algorithm for geofencing in flood disasters. Geofencing in flood disasters set warning areas for evacuation when flood areas are set in precent. We generate R-tree based model for user location tracking, user movement-based warning area reset, and GIS road information.*

Digital Twin Solutions based on 5G Edge Computing Architecture

Yeunwoong Kyung (Kongju National University, Korea), Youngjun Kim (Kyungnam University, Korea)

[Abstract] *In Industry 4.0, facilities and devices are connected and the data from them are collected in the cloud system where the big data analysis is performed for prediction, automation, and configuration. Moreover, this ecosystem changes the product's lifecycle as the automated and digital management including product design, simulation, manufacturing, validation, and maintenance. Meanwhile, one of the challenging issues in the industry filed is to consider the virtual environment which can be efficiently used for the prediction and simulation. Based on the need, digital twin (DT) has been considered as the one of the promising technologies to make the seamless integration between the physical and virtual entities, which enables the real-time synchronization. In this situation, 5G networks have introduced the edge computing architecture where the computing server is located to the edge close to the clients (i.e., physical entities). This makes the real-time synchronization possible, which can realize the DT services. Therefore, there have been efforts to conduct demonstration projects for DT-based Industry 4.0 in 5G networks. This paper reviews the current global efforts for Industry 4.0 solutions based on digital technology especially with digital twin concept.*

14:00 - 14:20   *Coffee Break*

14:20 - 15:20   *Session B-1*

Room: Canola Hall

Chair: Hyoseok Yoon (Hanshin University, Korea)

Multi-Model Speaker Recognition Techniques for Mobile Applications

Donghyeon Kim, Jonghwan Na, Bowon Lee (Inha University, Korea)

[Abstract] *Implementing a speaker recognition solution that can be applied immediately to an application is important in many cases. However, since machine learning-based speaker recognition solutions require prior speaker information, it is difficult to perform speaker recognition in real time when no such information is provided in advance. Therefore, this paper proposes a multi-model-based speaker recognition solution that does not require any prior knowledge of the speaker information. The proposed solution can be applied in a situation where each of the speakers runs an application that includes a speaker recognition function through their devices.*

A Taxonomy of Avatar-based Metaverse Interactions

Hyoseok Yoon (Hanshin University, Korea), Youngho Lee (Mokpo National University, Korea), Choonsung Shin (Chonnam National University, Korea)

[Abstract] *An avatar represents a user in various graphical forms in virtual worlds such as online games and metaverse platforms. In this paper, we propose a taxonomy for avatar-based interactions in the metaverse, specifically highlighting applicable aspects of the employed avatars.   Through the presented taxonomy, we attempt to include current avatar-based interactions and recent enabling technologies through avatar types, flexibility, fidelity, and interaction as our chosen criteria. To show the feasibility and applicability of our approach, we explore how recent metaverse studies, platforms, and interaction technologies can be situated in the proposed taxonomy.*

Smart Farm H/W Design for Educational Content Production

Chang Gyun Woo (Mokwon University, Korea), Soung Young Om (Smarty Co., Ltd., Korea), Mi Suk Lim (Nazarene University), Yoon Ho Kim (Mokwon University, Korea)

[Abstract] *With the advent of the era of great digital transformation and the spread of population aging, economic promotion through systematic reeducation of industrial manpower, which is a common task in the fields of society, economy, and education, is emerging as an important task of the times. In this study, we propose a smart farm H/W design and production method linked to educational content production. It is expected that continuous education and on-site utilization of highly experienced science and technology personnel through the production of educational contents of the produced H/W will promote a virtuous cycle in the educational ecosystem.*

15:30 - 16:30   *Session W-2 : AICT-2022*

Room: Cherry Hall

Chair: Seungwon Kim (Chonnam National University, Korea)

VR Interface for 3D Scanned-Body View

Sei Kang, Jaejoon Jeong, Ilwoo Park, Sangjoon Lee, Sungkyu Kim, Seungwon Kim (Chonnam National University, Korea)

[Abstract] When doctors examine the scanned 3D body from Computed Tomography (CT) or Magnetic Resonance Imaging (MRI), they mostly watched it displayed on the 2D screen. However, exploring the 3D contents (i.e., 3D body in this study) with a 2D screen reduces usability and usefulness. In this paper, we introduced a virtual reality system showing the 3D scanned body with a 3D display, and the cross-section image at the face where a plane was, which was controlled by a user(s). Our system supports single and multiuser use together with the drawing sketch function that can be used for recording information and communication cues. Additionally, the direct hand gesture interaction was implemented for virtual object selection and manipulation. We discuss the interface design consideration and propose future work.

Designing Mobile Mixed Reality Mashup for Sustainable Metaverse

Choonsung Shin, Hieyoung Jeong (Chonnam National University, Korea), Hyoseok Yoon (Hanshin University, Korea)

[Abstract] This paper introduces mobile mixed reality (MR) mashup for a sustainable metaverse. Especially content creation is very important for maintaining and extending the metaverse. In order to support user-driven content generation and sharing, the proposed MR mashup consists of an augmented reality (AR) device supporting an intuitive content mashup process and a virtual reality server maintaining contents related to real objects. The proposed MR mashup method allows users to easily create their own content in a mixed-reality environment that is connected to its corresponding virtual space.

VR Museum for Sharing Experience from Different Avatar Size

Jihye Shin, Suyeon Park, Sei Kang, Sangjoon Lee, Hyung-jeong Yang, Soo-Hyung Kim, Seungwon Kim (Chonnam National University, Korea)

[Abstract] With the help of the virtual reality (VR) technology, users start to explore the heritages in different avatar sizes and different ways. In this paper, we introduce a VR museum system that allows users to explore the digital heritage in different avatar sizes. In addition, we present a gaze interaction technology to share experience between users when having different avatar sizes. For the sharing experience, we added a window showing the other's view when both users' gaze points are overlapped each other for more than 1.2 seconds.

The Modified Go-Go Interaction with Eye Gaze

Jaejoon Jeong, Hyung-Jeong Yang, Soo-Hyung Kim, Seungwon Kim (Chonnam National University, Korea)

[Abstract] The Go-Go and HOMER (Hand-centered Object Manipulation Extending Ray-casting) interaction are popular virtual reality object selection and manipulation technology for the distant objects and based on hand gesture interaction. In this paper, we introduce an interaction technology enhancing the usefulness of them by adding gaze control function on top of them. We describe how we developed the prototype for better object selection and manipulation with hand and gaze interaction and discuss future research direction.

Designing Metaverse Exhibition based on Augmented and Virtual Reality

Choonsung Shin (Chonnam National University, Korea), Hyoseok Yoon (Hanshin University, Korea), Hieyoung Jeong (Chonnam National University, Korea)

[Abstract] This paper introduces an architecture for metaverse exhibitions created and shared by end-users. The proposed architecture consists of a metaverse cloud, an AR device, and a VR device.   The AR space is linked to VR space via the metaverse cloud. Thus, users are allowed to create and share their content in AR and VR space. Based on the architecture, we hope that creators intuitively offer their own exhibitions while visitors easily meet new artworks and artists anywhere anytime.

15:30 - 16:30   *Session B-2*

Room: Canola Hall

Chair: Jaechoon Jo (Hanshin University, Korea)

Analysis of Research Trends on Translated Korean Literary Works utilizing Text Mining

Kyu-Hyeon Oh, Young-Ae Jung (Sun Moon University, Korea)

[Abstract] *For several decades, language barriers are gradually fading with the development of ICT. We paid attention to that people can easily access and exchange various cultures with each other. In the literary field, It is not only as the proportion of foreign works in publishing translation has become higher, but also the importance of the translation of works and trends analysis has become more significant. Therefore, we aimed to focus on analyzing research trends from many research articles concerned with the translation research of Korean literature. This paper clarifies research trends based on research papers by utilizing text mining methods such as word cloud, odds ratio, and TF-IDF according to various criteria.*

Exploration of Educational Contents Open Market and Quality Management Using OER

Da Jeong Kim, Jeong Min Kong (Hanyang University, Korea)

[Abstract] *In the era of open learning, education has also changed due to the development of open educational resources. In particular, it is becoming important to develop an open market that allows educational institutions and the general public to choose and use paid and free content from government, public institutions and the private sector. The purpose of this study is to explore the development plan of educational contents open market using ORE through case analysis of Merlot, Khan academy, and Udemy.*

16:40 - 17:30   *Session W-3 : AICT-2022*

Room: Cherry Hall

Chair: Jin Sul Kim (Chonnam National University, Korea)

Optimization and Transfer Learning Approach

Usman Ali, Seungmin Oh, Sangwon Oh, Jinsul Kim (Chonnam National University, Korea)

[Abstract] *The latest YOLOv5 architecture, is optimized by training on a custom dataset to analyze model performance. The hyperparameters such as learning rate, momentum, weight decay, and warmup epoch in the backbone feature extraction stage was configured to achieve better results. Training time is significantly reduced by decreasing training parameters of the original model. The optimized Yolov5m model achieved mean average precision of 98.7% which is better in terms of accuracy as compared to the yolov5m model.*

Human motion prediction by learning sperate local parts and global vectors

Han-Wool Kim, Yeong-Jun Cho (Chonnam National University, Korea)

[Abstract] *With the emergence of drone, autonomous vehicles, and human interaction robots, it is important for predicting future human motion. With this global trend, this work focuses on the human motion prediction task with feed forward network structure. Referring to the baseline work SkelNet [5], training is conducted by dividing each part of human into local parts rather than holistic. This method has purpose to prevent intra pose intervention which distributes future human motion. In addition, training is proceeded by learning an independent network for global vectors representing the translation and rotation of human coccyx. Thus, holistic joint angles are divided with six branches and training proceeds to prevent intra-pose intervention. Then, final training is conducted with global network to preserve the correlation of each limb. For experiments, we evaluated mean angular error with Human3.6M dataset.   As a result of the experiment, our network has improvement performance on specific activity associating with walk.   Also, the network has adaptability to training with separated branches. In addition, training network with separated global vectors has better performance comparing with network which is not separated.*

Symbiotic organisms search-based cooperative co-evolution for multi-objective task scheduling in cloud computing

Mohammed Abdullahi (Ahmadu Bello University, Nigeria), Ibrahim Aliyu (Chonnam National University, Korea), Md Asri Ngadi (Universiti Teknologi Malaysia, Malaysia), Minsoo Han (Astana IT University, Kazakhastan), Tai-won Um, Jinsul Kim (Chonnam National University, Korea)

[Abstract] A task scheduling problem is a typical combinatorial problem in distributed computing applications such as cloud computing. The large-scale nature of data from current computing technologies results in a large solution search space, leading to higher computational time and sub-optimal schedule solutions. Recently, Symbiotic Organisms Search (SOS) has been applied to various optimization problems, and the results obtained were found to be competitive with state-of-the-art metaheuristic algorithms. However, the SOS algorithm's efficiency deteriorates as the search space size increases. This paper presents a Cooperative Co-evolutionary Multi-objective Symbiotic Organisms Search (CC-MSOS) for a multi-objective large-scale task scheduling optimization problem on an Infrastructure as a Service cloud computing environment. The proposed algorithm adopts a decomposition-based co-evolutionary strategy to split the task schedule problem into sub-problems, and the Symbiotic Organisms Search evolutionary procedure is performed on each sub-problem. The performance of the proposed CC-MSOS algorithm is evaluated on the CloudSim simulator, using both standard workload traces and synthesized workloads for larger problem instances of up to 5000. The CC-MSOS algorithm significantly improved optimal trade-offs between execution time (makespan) and financial cost (cost) while meeting deadline constraints with lower computational complexity.

Construction Site Safety Management Metaverse

Gwang Hyun Yu, Ji Hun Bae, Dang Thanh Vu, Jin Sul Kim, Jin Young Kim (Chonnam National University, Korea)

[Abstract] As society develops rapidly, various types of construction-site accidents can occur. To prevent this issue, CCTVs are installed and managed at the construction site but installed only in important places, and there is no automatic management system, so managers must monitor them 24 hours a day. In this paper, we propose a Construction Site Safety Management Metaverse that can monitor and automatically detect real-time accidents that may occur at construction sites. In the proposed Metaverse, managers can monitor the construction sites to be managed with avatars in real-time regardless of time and place, and in the event of an accident, they can check which construction site has a problem through an alarm and take action.

A Framework for Real-Time Illegal Filming Dron Detection

Seo-Bin Hwang, Yeong-Jun Cho (Chonnam National University, Korea)

[Abstract] As drones for filming proliferate, they are at risk of being exposed to illegal filming crimes by drones. Thus, studies that use artificial intelligence techniques to identify illegal drones are necessary. In this study, we propose a framework for automatic drone detection and recognition to prevent crimes by the unauthorized drone filming. First we propose a method that can detect drones and classify them in real-time with a static camera. Second, we categorize fast and special-purpose drones such as delivery drones. Third, we newly propose a motion imaging method that makes it easy to predict paths of detected drones. We extensively validated the proposed methods in several real drone datasets.

Channel Descriptor-GAN for Single Image Super-Resolution

Seungmin Oh, Hyejoo Shin, Junyoung Park, Jinsul Kim (Chonnam National University, Korea)

[Abstract] Single image super-resolution is a technique for converting low-resolution images into high-resolution images. The super-resolution model using GAN, a recent unsupervised learning, was able to derive performance that satisfies the user. In this paper, we propose a CD-GAN with the addition of Channel Descriptor to the generative network of SRGAN models, which improves PSNR and SSIM performance by about 2% over existing GAN models.

16:40 - 17:30 *Invited Talk*

Towards Internet of Value: Trustworthy & Decentralized Web 3.0 Platform with AI

Prof. Gyu Myoung Lee, Liverpool John Moores University, UK

Room: Canola Hall and Online Zoom Meeting Room

Chair: Young-Ae Jung (Sun Moon University, Korea)

18:30 –20:30 *Conference Banquet (with Best Paper Award Ceremony)*

Room: Canola Hall

Chair: Hye Young Lim

Wednesday, December 21

10:30 -　　　*Registration open (2nd Floor)*

2nd Floor, Ocean Suites Jeju Hotel

11:00 - 12:30　　*Session W-4 : CooSTEP-SFESE Workshop*

Room: Cherry Hall

Chair: Sangjun Byun (Daeduk University, Korea)

Education-oriented Social Enterprise Model

Yoon Ho Kim (Mokwon University, Korea)

H/W, F/W and S/W Design for Smart Farm

Young Park (Chungbuk Provincial University, Korea), Nam Hyung Cho (Chungbuk Health & Science University, Korea)

How to build a test bed for a Smart Farm?

Jae Myeong Choi (Mokwon University, Korea)

Smart Farm in IoT & Market Engineering

Ki-Hong Park (Osan University, Korea)

11:00 - 12:30　　*Session B-3*

Room: Canola Hall

Chair: Yangsun Lee (Hanshin University, Korea)

Performance Analysis of DEM and glB/glTF based on Blender

Dong-Yeop Lee (Korea Electric Power Research Institute, Korea Electric, Korea), Jae Myeong Choi (Mokwon University, Korea)

[Abstract] *Rendering of 3D content is an important factor in imparting realism when creating content, but it takes a lot of time. In this paper, we proposed a method for improving rendering performance by reducing a huge amount of 3D data in a web environment. In addition, performance tests were conducted using the DEM and 3D model elevation data.*

A Study on the Use of ICT Convergence Certification as a International Certification System

YoungChul Kim (ICT Polytech Institute of Korea, Korea)

[Abstract] *In this paper, various fields such as safety, energy, security, broadcasting, and medical care have recently been fused through the convergence between ICTs. In this regard, I would like to introduce the ICT convergence quality certification system being implemented in Korea and review it as an international certification system to expand it. As a result, domestic settlement is necessary to expand to an international ICT convergence quality certification system. In addition, institutional support is needed to become an international certification system.*

A Study on Measurement Methods for Designing Prediction Algorithm of Carbon Emission in Pighouse

Uk-Hyeon Yeo (Electronics and Telecommunication Research Institute, Korea), Sun-Hyoung Lee, Rack-Woo Kim, Su-been Ahn, Seung-Hun Lee (Kongju National University, Korea)

[Abstract] *Greenhouse gases such as carbon dioxide, methane, and nitrous oxide emitted from agriculture accelerate global warming, causing extreme climate phenomena such as heat waves and typhoons, and great damage. In line with the carbon neutrality of 2050, efforts of managing carbon emissions are also required to minimize the greenhouse gases in the livestock sector. Accordingly, researches of carbon emission measurement, analysis, and reduction measures in the livestock sector is underway in South Korea, but most of them are limited to cattle, that are not carried out in various breeds such as cattle, pigs, and chickens. Although pig carbon emissions produce the second largest carbon after cow carbon emissions, there are no researches or technologies related to carbon emissions (methane, nitrous oxide) in pig farms. In addition, since pigs are sensitive to livestock disease infection (foot-and-mouth disease, African swine fever) and changes in the growth environment (ventilation), it is difficult for farmers to conduct researches and experiments. Therefore, it is believed that difficulties in experimenting with actual farms such as entering researchers for experiments, controlling various growth environments in facilities, and installing many types of sensors can be solved through the construction of a small test bed.*

Digital Twin Architecture for Carbon Emissions Management in Pig Houses

Uk-Hyeon Yeo, Dae-Heon Park, Hyeon Park, Jee-Sook Eun (Electronics and Telecommunication Research Institute, Korea)

[Abstract] *Korea's pork consumption accounts for 48.7% of the total meat consumption, and it consumes 32.3kg (second-largest in the world) annually per person in Korea. In order to supply stable pork in response to these demands and to solve the practical problems facing the pig industry, pig houses are being enlarged and modernized. Greenhouse gas emissions inevitably occur due to intestinal fermentation and manure treatment that occurs while raising livestock. Global greenhouse gases emitted from the livestock sector account for 14.5% of the total emissions, while domestic statistical data show only 1.4%. The reason why domestic emissions were calculated lower than global greenhouse gas emissions is that accurate monitoring and prediction of carbon emissions in the livestock sector is not made. Thus, ICT-based carbon emission monitoring and prediction technology for the pig industry are needed to efficiently manage the livestock industry's carbon emission, which accounts for a high percentage of greenhouse gas emissions. Therefore, digital twin architecture and detailed technologies for the management of carbon emissions from pig houses were introduced.*