CECNET2020
CONFERENCE PROGRAM

October 25-28, 2020
Korea Standard Time (UTC/GMT+9:00)
ONLINE-Microsoft Teams Meeting

Table of Contents

Part I Conference Schedule

09:00-11:00	MS Teams Online Conference Testing and Ice Breaking
15:00-17:00	MS Teams Online Conference Testing and Ice Breaking Continued

10:00-10:10	WELCOME SPEECH *Prof. Beomjoon Kim, Department of Electrical Engineering, Keimyung University, Korea*
10:10-10:50	**Keynote Speech 1:** Epitaxial Growth and Characteristics of Gallium Oxide Based Ultrawide Bandgap Semiconductors *Prof. Qixin Guo, Department of Electrical and Electronic Engineering, Director of Synchrotron Light Application Center, Saga University, Japan*
10:50-11:00	BREAK
11:00-11:40	**Keynote Speech 2:** Artificial Intelligence in Health Care *Prof. Huiyu (Joe) Zhou, School of Informatics, University of Leicester, United Kingdom*
11:40-14:00	LUNCH BREAK
14:00-17:00	**Oral Session 1: Electronics Technology**

09:00-12:20	**Oral Session 2: Sensors Networks and Network Security**
11:50-14:00	LUNCH BREAK
14:00-16:55	**Oral Session 3: Signal Processing and Data Processing**

Part II Keynote Speeches

Keynote Speech 1: Epitaxial Growth and Characteristics of Gallium Oxide Based Ultrawide Bandgap Semiconductors

Speaker: Prof. Qixin Guo
Department of Electrical and Electronic Engineering
Director of Synchrotron Light Application Center, Saga University, Japan

Bio: Prof. Dr. Guo received B. E., M.E., and Dr. E degrees in electronic engineering from Toyohashi University of Technology in 1990, 1992, and 1996, respectively. He is currently a Professor of Department of Electrical and Electronic Engineering, Saga University as well as Director of Saga University Synchrotron Light Application Center. His research interests include epitaxial growth and characterization of semiconductor materials. Prof. Guo has published more than 300 papers in scientific journals including Nature Communications, Advanced Materials, Physical Review B, and Applied Physics Letters with more than 6000 citations (h-index: 41).

Abstract of the speech: The Si based technologies were spawned by the demonstration of the first transistor. Until the early 1990s, semiconductor technologies were limited to Si and the conventional III-V compounds such as GaAs and GaP which have relatively narrow bandgap of less than 2.3 eV. The ultrawide bandgap semiconductors including Ga_2O_3, Diamond, and AlN which have bandgaps significantly larger than the 3.4 eV of GaN had proven extremely challenging to develop, despite their obvious potential advantages for optoelectronics and higher breakdown voltages for power electronics. The success in obtaining high quality β-Ga_2O_3 bulk substrates has positioned this material as a strong candidate for next-generation devices such as ultraviolet light emitting diode and photodetector. A wider bandgap range is of great merit as it allows the design of devices such as high sensitive wavelength-tunable photodetectors, cutoff wavelength-tunable optical filters in more broad range. Al is a candidate to enlarge the bandgap of Ga_2O_3 because Al_2O_3 has a larger bandgap (~8.8 eV) and the similar electron structures of Al and Ga makes the alloy $(AlGa)_2O_3$ possible. In this talk, we will report on the growth and characterization of these films. Ga_2O_3 based oxide films were deposited on (0001) sapphire substrates by oxygen plasma assisted pulsed laser deposition. We have demonstrated that the bandgap energy of the $(AlGa)_2O_3$ films can be tailored by controlling the Al contents in the films at the growth temperature as low as 200℃. Recent progress on the growth of these ultrawide oxide semiconductors will also been reported.

Keynote Speech 2: Artificial Intelligence in Health Care

Speaker: Prof. Huiyu (Joe) Zhou
School of Informatics, University of Leicester, United Kingdom

Bio: Dr. Huiyu Zhou received a Bachelor of Engineering degree in Radio Technology from Huazhong University of Science and Technology of China, and a Master of Science degree in Biomedical Engineering from University of Dundee of United Kingdom, respectively. He was awarded a Doctor of Philosophy degree in Computer Vision from Heriot-Watt University, Edinburgh, United Kingdom. Dr. Zhou currently is a Professor at School of Informatics, University of Leicester, United Kingdom. He has published over 300 peer-reviewed papers in the field. He was the recipient of "CVIU 2012 Most Cited Paper Award", "MIUA 2020 Best Paper Award", "ICPRAM 2016 Best Paper Award" and was nominated for "ICPRAM 2017 Best Student Paper Award" and "MBEC 2006 Nightingale Prize". Dr. Zhou serves as the Editor-in-Chief of Recent Advances in Electrical & Electronic Engineering and Associate Editor of "IEEE Transaction on Human-Machine Systems" and "IEEE Access", and Area Chair of IJCAI and BMVC. He is one of the Technical Committee of "IEEE Cognitive and Development Systems", "Information Assurance & Intelligent Multimedia-Mobile Communication in IEEE SMC Society", "Robotics Task Force" and "Biometrics Task Force" of the Intelligent Systems Applications Technical Committee, IEEE Computational Intelligence Society. He has given over 90 invited talks at international conferences, industry and universities, and has served as a chair for 60 international conferences and workshops. His research work has been or is being supported by UK EPSRC, MRC, EU, Royal Society, Leverhulme Trust, Puffin Trust, Alzheimer's Research UK, Invest NI and industry.

Abstract of the speech: In this talk, I will introduce the concept of artificial intelligence (AI) and its uses. Then, I discuss the current public opinion on AI and its hype. I also present the regulation of AI in the community, followed by the discussion on challenges in the field. Finally, I predict the future work in AI using a few examples.

Part III   Oral Presentations

Oral Presentation Guidelines

- Online Oral Presentations will be conducted via [Microsoft Teams Meeting](#) (Click to see how to join CECNet2020 via Teams)
- All presenters are requested to reach the Online Session Room prior to the schedule time and complete their presentation on time.
- All presentations are scheduled in Korea Standard Time (UTC/GMT+9).
- If a presenter is not able to show up via Teams, the session chair / conference secretary will download and play the pre-recorded video presentation during his/her scheduled presentation time, if listeners have questions about the presentation, please contact the conference secretary to forward the questions.
- Signed and stamped electronic presentation certificate would be issued via e-mail after presentation

Best Oral Presentations Selection

Selection Criteria:

The session chair will select one best oral presentation from his/her session based on the following criteria:

- ✓ Research Quality
- ✓ Presentation Performance
- ✓ Presentation Language
- ✓ PowerPoint Design

Best Oral Presentations Award

The Best Presenter will receive an official certificate and a free registration to the CECNet2021.

Session 1: Electronics Technology

Please Click [Video List](#) to Access the Video Presentation.
Please Click http://www.academicconf.com/teamslink?confname=cecnet2020 to enter the conference meeting room.
***Session Chair:* Dr.** *Chia Chao Kang, Xiamen University Malaysia, Malaysia*

Time: 14:00-17:00, Monday, October 26, 2020

14:00-14:20	CNT2715 *(Invited Talk)*	Rational Harmonic Mode-Locking Operation of Bismuth-Based Fiber Laser Source *Assoc. Prof. Yutaka Fukuchi, Tokyo University of Science, Japan*
14:20-14:40	CNT2720 *(Invited Talk)*	Transfer Learning Based CNN and Visual Feedback Control for a Pick and Place Robot *Prof. Fusaomi Nagata, Sanyo-Onoda City University, Japan*
14:40-15:00	CNT2731 *(Invited Talk)*	Innovative Design Techniques for Notch Filters *Prof. Rohini Deshpande, REVA University, India*
15:00-15:20	CNT2749 *(Invited Talk)*	Research on Proton-Diffusion in Single Crystal Vanadium Dioxides *Assoc. Prof. Teruo Kanki, Osaka University, The Institute of Scientific and Industrial Research, Japan*
15:20-15:40	**COFFEE BREAK**	
15:40-16:00	CNT2719 *(Invited Talk)*	Extended Gate-Type Organic Thin-Film Transistors as Chemical Sensing Platforms for Healthcare Applications *Prof. Tsuyoshi Minami, The University of Tokyo, Japan*
16:00-16:15	CNT2705	Cost-Efficient RAA Technology for Development of the High-Gain Steerable Antennas for mmWave Communications *Dr. Alexander Maltsev, University of Nizhny Novgorod, Russia*
16:15-16:30	CNT2670	Real Time Digital Filter for a Front-End Electronics in Dark Matter and Neutrino Measurements *Dr. Alejandro D. Martinez R., Politecnico di Torino, Italy*
16:30-16:45	CNT2681	Psychological Factors in Consumer Acceptance of Artificial Intelligence in Leisure Economy: A Structural Equation Model *Dr. Xuelin Xian, Shenzhen Institute of Information Technology, China*
16:45-17:00	CNT2694	Modeling of a Leg and Knee System for the Analysis of Human Gait by Means of State Feedback Control *Dr. P. A. Ospina-Henao, Universidad Santo Tomás., Colombia.*

Abstracts of Session 1

CNT2715
Rational Harmonic Mode-Locking Operation of Bismuth-Based Fiber Laser Source

Yutaka Fukuchi
Tokyo University of Science, Japan

Abstract. Wavelength-tunable high-repetition-rate optical pulse generation is essential for many applications such as high-speed optical communication systems and optical signal processing. Harmonically mode-locked fiber lasers have proven to be able to generate wavelength-tunable short pulses with small timing jitter and gigahertz repetition rates. However, maximum repetition rate of the harmonically mode-locked fiber lasers is normally limited by the bandwidth of the intra-cavity modulator and the operating frequency range of the drive electronics. Recently, a scheme called the rational harmonic mode-locking has been proposed and demonstrated to generate optical pulses at very high repetition rates by driving the laser system at a frequency slightly offset from one of its harmonics. In this presentation, we review a stable and wavelength-tunable rational harmonic mode-locked short-cavity fiber laser employing a 1.5-m-long bismuth-oxide-based erbium-doped fiber and a 2.5-m-long bismuth-oxide-based highly nonlinear fiber. Since the short bismuth-oxide-based erbium-doped fiber has a wide gain profile, continuous wavelength tuning covering both the C-band and the L-band can be achieved. The pulse-amplitude equalization can also be achieved by adjusting the bias level and the modulation depth of the intra-cavity modulator. The bismuth-oxide-based highly nonlinear fiber has an ultra-high nonlinear coefficient of 1100 $W^{-1}km^{-1}$, about 50-60 times higher figure than those of the conventional silica-based highly nonlinear fibers. Because of this feature, the length of the nonlinear fiber for effective suppression of the supermode noise is dramatically shortened; the total cavity length is as short as 10 m. Thus, stable and amplitude-equalized optical pulses up to 40 GHz are successfully obtained for the entire tunable wavelength range.

Keywords: Tunable lasers, mode-locked lasers, fiber lasers, rare-earth materials, nonlinear optics, Kerr effect

CNT2720
Transfer Learning Based CNN and Visual Feedback Control for a Pick and Place Robot

Fusaomi Nagata[1], Kohei Miki[1], and Keigo Watanabe[2]
[1] *Graduate School of Engineering, Sanyo-Onoda City University, Japan*
[2] *Graduate School of Science and Engineering, Okayama University, Japan*

Abstract. Artificial neural network (ANN) which has five or more layers structure is called deep NN (DNN) and it has been recognized as one of the most powerful machine learning techniques. Convolutional neural network (CNN) has a reasonable structure for image recognition, so that it has been being applied to defect inspection processes in various industrial manufacturing lines. It is also known that support vector machine (SVM) has a superior ability for binary classification in spite of only having two layers. The authors have already developed a CNN&SVM design and training tool for easy consideration of defect detection systems, while the effectiveness and the validity have been proved through several CNNs design, training and evaluation [1, 2]. The tool further enables to facilitate the design of a CNN model based on transfer learning concept [3].

For example, when industrial robots are applied to pick and place tasks of resin molded articles, information of each object's position and orientation is essential. Recognition and extraction of the object position in an image are not so difficult if some image processing technique is used, however, that of orientation is not easy due to the variety in shape. In this paper, a pick and place robot is introduced while implementing a

visual feedback control and a transfer learning-based CNN. The visual feedback control enables to omit the complicated calibration between image and robot coordinate systems, also the transfer learning based CNN allows the robot to estimate the orientation of target objects. The effectiveness and validity of the system is demonstrated through pick and place experiments using a small articulated robot named DOBOT.

Keywords: Pick and place robot, convolutional neural network, transfer learning, visual feedback control

References
[1] F. Nagata, K. Tokuno, K. Nakashima, A. Otsuka, T. Ikeda, H. Ochi, K. Watanabe, M.K. Habib, Fusion method of convolutional neural network and support vector machine for high accuracy anomaly detection, Procs. of the 2019 IEEE International Conference on Mechatronics and Automation (ICMA 2019), pp. 970-975, Tianjin, China, August 2019.
[2] F. Nagata, K. Tokuno, K. Mitarai, A. Otsuka, T. Ikeda, H. Ochi, K. Watanabe, M.K. Habib, Defect detection method using deep convolutional neural network, support vector machine and template matching techniques, Artificial Life and Robotics, Vol. 24, No. 4, pp 512-519, 2019.
[3] F. Nagata, K. Miki, Y. Imahashi, K. Nakashima, K. Tokuno, A. Otsuka, K. Watanabe and M.K. Habib, Orientation detection using a CNN designed by transfer learning of AlexNet, Procs. of the 8th IIAE International Conference on Industrial Application Engineering (ICIAE2020), pp. 295-299, 2020.

CNT2731
Innovative Design Techniques for Notch Filters

Rohini Deshpande
School of Electronics and Communication Engineering, REVA University, Bengaluru, India

Abstract. In this talk I am proposing two innovative application specific FIR notch filters that are free from most of the undesired features such as non-optimal design, ripple in pass bands, highly involved mathematical computations etc. 1. Maximally flat, linear phase FIR notch filter with controlled null width. First part of the talk deals with design of a maximally flat, linear phase FIR notch filter with controlled null width. Design analyses carried out with first, third and fifth order zero derivative constraints of the amplitude response of the FIR filter at notch frequency is discussed. Detailed analysis in the research work discussed shows that the null width of a maximally flat, linear phase FIR notch filter can be controlled by suitable selection of individual zero odd order derivatives and also by the successive addition of zero odd order derivatives at the notch frequency ω_d 2. FIR notch filter with highly narrow rejection bandwidth. Design of FIR notch filters (NF) with highly narrow rejection bandwidth (RBW) is discussed. Reduction in the RBW can be achieved progressively in three stages. In the first stage an FIR notch filter is designed from a second order IIR prototype filter. For a given length L of the NF, the maximum permissible value of 'r' (the pole length of IIR prototype filter) is chosen to achieve very narrow RBW of the FIR filter. In the next stage by using an Amplitude Change Function (ACF):$H(z)(2 - H(z))$, the designed filter is sharpened. Consequently, the RBW of the resulting NF is reduced to almost half of the earlier value. In the third stage, RBW is further reduced by repeated sharpening of the filter by the same ACF.

Keywords: Notch filter, rejection bandwidth, controlled nullwidth, bi-notch filter

CNT2749
Research on Proton-Diffusion in Single Crystal Vanadium Dioxides

Teruo Kanki
Osaka University, The Institute of Scientific and Industrial Research, Japan

Abstract. Vanadium dioxide (VO_2) is a strongly correlated electronic material with a metal-insulator transition (MIT) over room temperature. Ion-doping to VO_2 dramatically alters its transport properties and the MIT temperature. Recently, insulating hydrogenated VO_2 (HVO_2) accompanied by a crystal structure transformation from VO_2 was experimentally observed. Despite the important steps taken towards realizing novel applications, fundamental physics such as the diffusion constant of intercalated protons and the crystal transformation energy between VO_2 and HVO_2 are still lacking. In this symposium I will talk investigation of the physical parameters of proton diffusion constants accompanied by VO_2 to HVO_2 crystal transformation with temperature variation and their transformation energies. It was found that protons could propagate several micrometers with a crystal transformation between VO_2 and HVO_2. The proton diffusion speed from HVO_2 to VO_2 was approximately two orders higher than that from VO_2 to HVO_2. The long-range propagation of protons leads to the possibility of realizing novel iontronic applications and energy devices.

CNT2719

Extended Gate-Type Organic Thin-Film Transistors as Chemical Sensing Platforms for Healthcare Applications

Tsuyoshi Minami
Institute of Industrial Science, The University of Tokyo, Japan

Abstract. Organic thin-film transistors (OTFTs) have attractive features including lightweight, mechanical flexibility, compact integration. Utilizing such features, we have employed extended gate-type OTFTs functionalized by bio- or artificial materials toward new sensing platforms [1-3]. Due to molecular recognition phenomena, the electrical properties (e.g. drain current, threshold voltage, and transfer or output characteristics) of the OTFT devices vary upon by the addition of the analyte on the extended-gate. Based on the working principle, we have successfully detected organic/inorganic cations, anions, nonions and biomacromolecules [1]. It should be noted that the OTFTs offer simple analytical methods without pre-treatments and complicated procedures. As representatives, we herein demonstrate our successful detection of lactate and immunoglobulins by the OTFTs (Fig. 1A, B) [2,3]. Furthermore, the OTFTs can be integrated with microfluidic systems [4] for real-time monitoring in biological fluids. We realized the real-time monitoring of changes in glucose (Glc) concentrations (Fig.1C) [4]. Thus, the OTFTs are suitable as sensor devices for the analyses of biological molecules. Overall, our approach would be reliable sensing platforms in practical analyses in the fields of biochemistry and clinical chemistry.
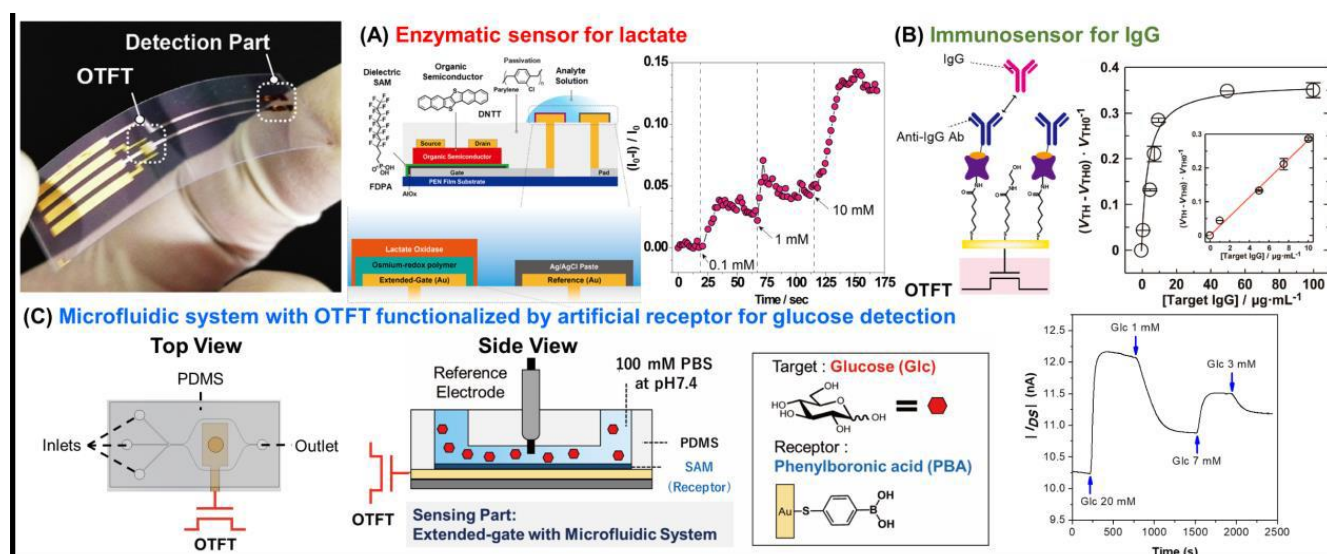
Fig.1 Photograph of the fabricated OTFT. (A) Left: Schematic illustration of OTFT enzyme sensor for lactate. Right: Time-course of drain current with increasing concentration of lactate. (B) Left: Immobilization of anti-IgG antibody on the extended-gate electrode. Right: Transfer characteristics (IDS–VGS) of the OTFT upon titration with IgG in a D-PBS solution with 0.1 wt% bovine serum albumin (BSA). Inset: [IgG] = 0–100 μg/mL. (C) Left: Top view of the OTFT integrated with the microfluidic system for glucose detection. Middle: Side view of the integrated device. Right: Time-course of the drain current with randomly changing concentration of Glc (pseudo glucose consumption by living cells).

Keywords: Organic thin-film transistor, molecular recognition, microfluidic system, lactate, immunoglobulin, glucose

References
[1] T. Minami et al., ACS Sens., 2019, 4, 2571 (Front Cover);
[2] T. Minami et al., Anal. Sci., 2019, 35, 103;
[3] T. Minami et al., Appl. Phys. Lett., 2014, 104, 243703 (The most accessed article in 2014-2016);
[4] T. Minami et al., ChemElectroChem, 2020, 7, 1332 (Cover Feature)

CNT2705   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2670   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2681   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2694   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

Session 2: Sensors Networks and Network Security

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Session Chair: Dr. Kevin Foltz, Institute for Defense Analyses, USA

Time: 09:00-12:20, Tuesday, October 27, 2020

09:00-09:25	CNT2722 *(Invited Talk)*	Dynamics of Software Defined Networks Investigated via Diffusion Approximation Queueing Models *Prof. Tadeusz Czachorski, Silesian University of Technology, Poland*
09:25-09:55	*CNT2750* *(Invited Talk)*	Probabilistic Home-Based Routing Scheme for Delay Tolerant Networks *Assoc. Prof. Abdullh Hasanat, University of Nizwa, Oman*
09:55-10:15	CNT2645	Secure Server Key Management Designs for the Public Cloud *Dr. Kevin Foltz, Institute for Defense Analyses, USA*

10:15-10:30	CNT2665	A Routing Protocol Based on both of Density Variation and Distance-Aware for WSNs *Dr. Dongmei Xing, Nanchang University, China*
10:30-10:50		**COFFEE BREAK**
10:50-11:05	CNT2721	A Novel Approach to Radiometric Identification *Dr. Alexander Ivchenko, Moscow Institute of Physics and Technology, Russia*
11:05-11:20	CNT2746	All Fiber Temperature Sensor Based on TMD Alloy Coated Tapered Fiber *Dr. Sinjin Tan, UOW Malaysia KDU, Malaysia*
11:20-11:35	CNT2735	Network Forensics Investigation in Virtual Data Centers Using ELK *Assoc. Prof. P. RAJESH, Koneru Lakshmaiah Education Foundation (KL University) Guntur, India*
11:35-11:55	CNT2736	Modelling of a Wide-Band Piezoelectric Energy Harvester to Power IoT *Dr. Prateek Asthana, National Institute of Technology Hamirpur, India*
11:55-12:20	CNT2756 *(Invited Talk)*	Online Social Networks: Malware Threats and Countermeasures in Relation to Topological Network Properties *Assoc. Prof. Uyen T. Nguyen, Lassonde School of Engineering, York University, Canada.*

Abstracts of Session 2

CNT2722
Dynamics of Software Defined Networks Investigated via Diffusion Approximation Queueing Models

Tadeusz Czachorski
Institute of Theoretical and Applied Informatics, Polish Academy of Sciences, Poland

Abstract. Network structures based on static switches are not well suited for the needs of high performance, energy efficiency and reliability in dynamically changing environments, and are not flexible enough to maintain Quality of Service (QoS) for increasingly complex networks. This may be changed by Software Defined Networks which use intelligent programmable controllers being aware of the overall state of nodes and links, and able to dynamically manage the network and adapt it to new conditions. They provide flexible and scalable routing by separating the control and data planes for traffic engineering, link failure recovery, load balancing and security issues. Since standard queueing models are not well adapted to analyse the transient regime, we propose a tractable diffusion approximation for both the transient and steady-state behaviour. The model may represent any network topology transmitting time-dependent flows with routing changes. It computes queue length and delay distributions at each nework node and along complete paths between senders and receivers. For realistic router parameters, we show that transients states occupy a large fraction of time. Thus network optimisation conducted with SDN controllers should include the effect of time-dependent behaviours. Detailed numerical examples are presented.

CNT2750
Probabilistic Home-Based Routing Scheme for Delay Tolerant Networks

Abdullh Hasanat
Computer Engineering, Department of Electrical and Computer Engineering, University of Nizwa, Oman

Abstract. In traditional Mobile Adhoc Networks (MANET) routing algorithms, the existence of a sustainable path between the source and destination is a crucial issue. Despite the rapid advancement in Internet-of-Things (IoT) technologies, these algorithms are shown to be unsuccessful in Delay Tolerant Networks (DTNs) since the network is almost disrupted, and then such a path is not guaranteed. Although Store-and-Forward routing approach has provided an adequate solution for these networks, it suffers from the large end-to-end delay and the additional traffic and communication costs incurring the network. In this talk, I will present the most recent work on routing in DTNs. Then, I will introduce an efficient single-copy home-based routing scheme for DTNs via two different scenarios, blind and semi-blind, based on the amount of available knowledge about the destination. Simulation results presented in this Speech will demonstrate how efficient the presented scheme is with reference to the Epidemic, the unrestricted flooding algorithm. Moreover, compared to state-of-art algorithms, the presented scheme showed tremendous performance improvement in terms of communication cost, end-to-end delay and successful delivery ratio.

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CNT2665   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2721   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2746
All Fiber Temperature Sensor Based on TMD Alloy Coated Tapered Fiber

S. J. Tan[1], Z.C. Tiu[2], X. S. Cheng[1] and H. Ahmad[3]
[1]School of Engineering, OUW Malaysia KDU, Seksyen U1, 40150 Shah Alam, Selangor, Malaysia
[2]Faculty of Engineering & IT, Segi College Subang Jaya, 47600 Subang Jaya, Selangor, Malaysia
[3]Photonics Research Centre, University of Malaya, 50603 Kuala Lumpur, Malaysia

Abstract. All fiber temperature sensor based on MoWS2-rGO coated tapered fiber is demonstrated. The large evanescent field of tapered fiber allows MoWS2-rGO coated tapered fiber to absorb the surrounding heat and changes the refractive index of MoWS2-rGO coated tapered fiber. The refractive index change is due to thermo-optic effect. When there is a change of surrounding temperature, the refractive index of the coated tapered fiber changes and this subsequently alters the incident light polarization. The change of light polarization is measured using polarimeter. The sensitivity of the proposed temperature sensor is determined at 0.63°/°C.

CNT2735
Network Forensics Investigation in Virtual Data Centers Using ELK

P. Rajesh
Koneru Lakshmaiah Education Foundation (KL University) Guntur, India

Abstract. Network forensics is a focus on collecting, monitoring, reporting Network log analysis and investigation success or failure in a network. Major goal of security provided to the network is to protect sensitive customer information online, Lateral movement with RDP(Remote Desktop Protocol), Ransomware running on an endpoint, large Data exfiltration from multiple endpoints, malicious attacks etc, degrade Network Performance. but crime scenario start to identify crimes and evidence network attack digital device or other component. Network access logs analysis main part in the investigation. Network forensic is an offset of digital forensics used for the monitoring and analysis of computer network traffic intended for collecting information, lawful proof against illegal activity, or intrusion detection on the network. Network examination manages unstable and persuasive data. The project is intended to deliver the device relying upon the point of view of Network investigation in Virtual Data Centers. Proposed methodology is based on ELK Stack (Elasticsearch, Logstash, and Kibana) to collecting, monitoring, reporting Network log analysis and Machine learning Techniques to automate the cron job process. It additionally helps in law requirement investigation. Data center is using virtual networks have problem for log analysis and real time log in time stamp based analysis using network forensics approaches. Network forensics investigation in virtual data-center is an art and science seeking to make sense out of computer- generated records. Network forensics investigation is a process to identify suspected logs in a network. Data center have huge amount of log file generated Esxi server,VCenter,VMware.

Keywords: Elastic search, logstash, kibana, network forensics, virtual data centers, rally for bench marking

CNT2736

Modelling of a Wide-Band Piezoelectric Energy Harvester to Power IoT

Prateek Asthana
Department of Electronics and Communication Engineering, National Institute of Technology, Hamirpur, India

Abstract. Piezoelectric energy harvesting refers to conversion of mechanical energy into usable electrical energy. In the modern connected world, wireless sensor nodes are scattered around the environment. These nodes are powered by batteries. Batteries require regular replacement, hence energy harvesters providing continuous autonomous power are used to power these sensor nodes. These harvester capture a wide-band of ambient vibrations and convert them into usable electrical energy. In order to capture random ambient vibrations harvester used is a wideband energy harvester based on conventional seesaw mechanism. The proposed structure operates on first two resonant frequencies in comparison to the conventional cantilever system working on first resonant frequency. Eigen frequency, as well as response to a varying input vibration frequency, is carried out, showing better performance of seesaw cantilever design. In this work, modelling of seesaw energy harvester is being performed.

CNT2756

Online Social Networks: Malware Threats and Countermeasures in Relation to Topological Network Properties

Uyen T. Nguyen
Lassonde School of Engineering, York University, Canada.

Abstract. The popularity and diverse uses of online social networks (OSNs) have given incentives to hackers and cybercriminals to carry out attacks using malicious software (malware). Given very large populations on social networks (e.g., 2.6 billion users on Facebook), a successful attack can result in tens of millions of user profiles being compromised and computers and devices being infected. This presentation provides an overview of malware threats in OSNs and countermeasures. In this talk, I will first present topological properties of OSNs, namely, low average network distances, power-law distributed node degrees, and high clustering coefficients. I will then discuss different types of malware targeting OSN users as well as countermeasures against OSN malware. The presentation also highlights how the topological properties of OSNs affect the propagation of malware and design of countermeasures.

Session 3: Signal Processing and Data Processing

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***Session Chair:* Dr.** *Chia Chao Kang, Xiamen University Malaysia, Malaysia*

Time: 14:00-16:55 Tuesday, October 27, 2020

14:00-14:20	CNT2704	3D Air-Ground Channel Model Reconstruction Based on the Experimental Data and Q-D Method *Dr. Olesya Bolkhovskaya, University of Nizhny Novgorod, Russia*
14:20-14:35	CNT2712	Investigation of the Effect of Different Covariance Estimation Methods on the Performance of Least Squares Compressive Covariance Sensing *Dr. Nuha A. S. Alwan, University of Baghdad, Baghdad, Iraq*
14:35-15:00	CNT2745 *(Invited Talk)*	An LSTM Based Approach for Load Balancing in Cloud Computing *Prof. Noman Islam, Iqra University, Pakistan*
15:00-15:20	CNT2747	Single Image Dehazing and Defogging: A Comprehensive Approaches Based on Visibility Restoration and Enhancement Techniques *Dr. Apurva Kumari, B V Raju Institute of Technology, India*
15:20-15:40		**COFFEE BREAK**
15:40-15:50	CNT2744	Digital Leap in Indian Education Sector During Covid-19 *Dr. Smt. Rachana C R, PG Wing of SBRR Mahajana First Grade College, India*
15:50-16:15	CNT2723 *(Invited Talk)*	Color Object Detection Based Image Retrieval Using ROI Segmentation with Multi-Feature Method *Assoc. Prof. Rohit Raja, Guru Ghasidas Vishwavidyalaya, India*

| 16:15-16:35 | CNT2734 | Role of Image Dehazing Under Poor Weather Conditions
Assoc. Prof. Suresh Raikwar, GLA University, India |
| 16:35-16:55 | CNT2742 | Towards Minimizing Delay and Energy Consumption in Vehicular Fog Computing (VFC)
Dr. Muzakkir Hussain, Aligarh Muslim University, India |

Abstracts of Session 3

CNT2704   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2712   To avoid repeatability issue, this abstract will be available after the full paper is published in the conference proceedings.

CNT2745
An LSTM Based Approach for Load Balancing in Cloud Computing

Noman Islam
Iqra University, Pakistan

Abstract. The notion of cloud computing is used for providing service as a utility over the internet via dynamic provisioning of resources. Cloud computing suffers from several issues that need to be resolved before its true realization. Load balancing is one of those challenges that requires significant research consideration. In this talk, we will talk about load balancing challenges in cloud computing. The talk presents a taxonomy of those approaches. We will also present a long short term memory (LSTM) based approach for load balancing in cloud environments. Deep learning has been used as a crosscutting solution for several research problems. Using LSTM, one can model long term dependencies between current and past data. This modelling of future state has been utilized and this talk will present a solution that predicts future state of the VM. Based on that, one can proactively migrate VM in case of a possible overload prediction.

CNT2747
Single Image Dehazing and Defogging: A Comprehensive Approaches Based on Visibility Restoration and Enhancement Techniques

Apurva Kumari
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Abstract. Bad weather has an adverse impact on outdoor vision systems and also increases the possibilities of traffic crashes and road accidents. Outdoor images captured in bad weather conditions such as haze and fog are degraded due to the scattering of atmospheric particles. The decreased visibility significantly impacts on driving assistance systems developed for automatic vehicles. So, clear visibility is very essential for the outdoor computer vision systems. Image deweathering is one of the ill posed problems since the transmission depth estimation is very uncertain. Therefore, the most accurate estimation of transmission depth is indispensable. To utilize the concept of image restoration and enhancement based approaches estimate trans-

mission depth accurately and restore the scene radiance.

CNT2744

Digital Leap in Indian Education Sector during Covid-19

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Abstract. Schools and colleges closures in response to the COVID-19 pandemic have brought in a lot of speculations and surprises in the minds of the students in India. As the epidemic broke out, more than 370 million children and youth are not attending school because of temporary or indefinite countrywide school closures mandated by governments. India's digital divide, poor connectivity and lack of smart gadgets is proving as an issue to many students who are keen on attending online classes. Institutions like Indian Institute of Technologies have found that about 10 per cent of their students are not equipped to access online classroom instructions from home. For younger children, the responsibility lies on parents. Many primary schools are sending homework to the parents online and consider it their responsibility to teach the wards. In some schools the online classes are continuing for a period of 4 to 5 hours regularly, which is also a cause for concern.

Indian education sector is moving fast towards digital education policy. Though New Education policy of India (NEP) had visualized this, the Covid Pandemic has fastened the process. The digitalization of education has opened up plenty of opportunities to the students. It has helped them to opt for flexible study options, allowing them to study as pet their convenient time and pace. Teachers on their part are finding it convenient to prepare their teaching plans taking advantage of digital technology. Since the current generation of children is well versed in digital tools, it has become convenient to teach younger generation using modern gadgets. It is found very surprisingly by teachers that the grasping capacity of children is much more than what the teachers had expected. The children of the age of 8-10 are capable of developing apps. They are also capable of uploading their own videos and watch the number of 'likes' for their videos. Children are in a position to grasp concepts like artificial intelligence, machine learning. At graduate level they understand 'Big data' concept.

There are innumerable challenges in online learning which include Lack of sustained internet connectivity, difficulty in teaching certain courses which involve laboratory experiments, teachers not being tech-savvy, Lack of standardised teaching/Learning content for regional languages, increased screen time for children/students, lack of formality, and so on. On the other hand, there are few positive Impacts of COVID-19 on Education System. They include, teachers making use of the concept of blended learning, encouraged use of Learning Management Systems, demand for open and Distance Learning, better time management opportunities for students, boost for many entrepreneurs/companies aiming at developing innovative ways of transforming the learning system by introducing various new platforms for online teaching and learning, quality of teaching material is improvising with time.

While the above aspects are observed in Indian education system, due to leap in digital education, the sector is beset with various other problems also. There is clear divide between urban and rural students. Also between the students form elite families and poorer families. Urban elite families have been able to provide smart phones, i- pads and laptops to their children to facilitate learning for their children whereas opposite is the case with regard to poorer families. The children of such families are denied of opportunities to digital education. Another major issue with regard to digital education is for the faculty to decide, the portions to be separated between on – line teaching and offline teaching. How much on-line teaching should be done, and how much to be supplemented by off-line needs to be decided by faculty in each stream which will become

a challenge. Also will the existing infrastructure in learning institutions, universities become redundant also needs to be examined.

CNT2723
Color Object Detection Based Image Retrieval Using ROI Segmentation with Multi-Feature Method

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Abstract. Nowadays content-based image retrieval (CBIR) framework is drawing in consideration of numerous analysts because of far-reaching applications found in numerous territories. In this paper, a new CBIR methodology is proposed and adequacy of any CBIR framework relies upon the features extracted from a color picture. In this work, firstly find the region of interest of the image using Sobel and Canny method and later on output is applied on HSV color space, it is clear to the human vision eye. For classification, a neural network is used and categorizes the data with class labels. The similarity distance is estimated between the query image and stored image with different similarity metrics like Manhattan distance, Euclidean distance, Chebyshev, Hamming distance and Jaccard distance. The experimental result is estimated on accuracy, precision. The experiment performed on two well-known databases i.e.: Corel-1k and Corel-5k dataset and new methodology proves the better accuracy results up to 87.33% and 68.93% respectively and improves the precision results also up to 86.36% and 68.47% respectively. In this paper, results are also extended up to 80%.

CNT2734   To be confirmed

CNT2742
Towards Minimizing Delay and Energy Consumption in Vehicular Fog Computing (VFC)

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Abstract. Vehicular Fog Computing (VFC) is a natural extension of Fog Computing (FC) in Intelligent Transportation Systems (ITS). It is an emerging computing model that leverages latency aware and energy aware application deployment in ITS. However, due to heterogeneity, scale and dynamicity of vehicular networks (VN), deployment of VFC is a challenging task. In this paper, we propose a multi-objective optimization model towards minimizing the response time and energy consumption of VFC applications. Using the concepts of probability and queuing theory, we propose an efficient offloading scheme for the fog computing nodes (FCN) used in VFC architecture. The optimization model is then solved using a modified differential evolution (MDE) algorithm. Extensive experimentations performed on real-world vehicular trace of Shenzhen, reveals the superiority of proposed VFC framework over generic cloud platforms. Reference: M.M. Hussain et.al. "Towards Minimizing Delay and Energy Consumption in Vehicular Fog Computing (VFC)", Journal of Intelligent and Fuzzy Systems, IOS Press, 2020, (I.F. - 1.85)

Reference
[1] M.M. Hussain et.al. "Towards Minimizing Delay and Energy Consumption in Vehicular Fog Computing (VFC)", Journal of Intelligent and Fuzzy Systems, IOS Press, 2020, (I.F. - 1.85)

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Welcome to submit papers to the related SCI/EI indexed journals listed

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Online ISSN 1350-911X; Print ISSN 0013-5194
IF: 1.343
Publication Type: Special Issue (JA)

International Journal of Sensor Networks
Online ISSN 1748-1287; Print ISSN 1748-1279
IF:1.428
Publication Type: Regular Issue (JA)
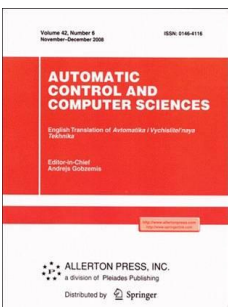
Journal of Internet Technology
Online ISSN 1607-9264
IF: 0.786
Publication Type: Special Issue (JA)

International Journal of Security and Networks (EI)
Online ISSN 1747-8413; Print ISSN 1747-8405
Publication Type: Regular Issue (JA)

Automatic Control and Computer Sciences (EI)
Online ISSN 1558-108X; Print ISSN 0146-4116
Publication Type: Regular Issue (JA)

Part V Acknowledgements

On behalf of the Organizing Committee of CECNet2020, we would like to take this opportunity to express our sincere thanks to the support and contributions of participants from all over the world. We would also like to express our sincere acknowledgements to the Technical Program Committee members who have given their professional guidance and valuable advice to the conference. Below are the lists of the Technical Program Committee members. For those who contribute to the success of the conference organization without listing the name here, we would love to say thanks as well.

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