RoViSP 2021

Enhancing Research and Innovation through the Fourth Industrial Revolution (IR 4.0)

5-6 April 2021

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The 11th International Conference on Robotics, Vision, Signal Processing & Power Applications

RoViSP 2021

Enhancing Research and Innovation through the Fourth Industrial Revolution (IR 4.0)

5-6 April 2021

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Message from,

Vice Chancellor
Universiti Sains Malaysia

First and foremost, I would like to congratulate the School of Electrical and Electronic Engineering, Universiti Sains Malaysia (USM) for organizing the International Conference on Robotics, Vision, Signal Processing and Power Applications (ROVISP2021) on 5 and 6 April 2021.

This conference represents the 11th ROVISP organized by the School since 2003 with "Enhancing Research and Innovation through the Fourth Industrial Revolution (IR 4.0)" as its theme. The theme reflects the close association between technological innovation and research as well as enforcing them through revolutionization of manufacturing industry and its related services. It is hoped that this conference would benefit the society in terms of understanding the importance of design, innovation and research towards creating a better-connected ecosystem, not only in manufacturing, but also in the betterment of the human development.

The Fourth Industrial Revolution (IR 4.0) is not about making better things, rather, it is about making things better. It also serves as a balance between industrial demands and goals which act as a tool in bringing complex interdependencies between the economy and society. In order to secure its future, one need to have promising research and development findings which can be matched with appropriate funding. Thus, many feasible solutions can be put into practice with the guidance and collaborative partnership from industrial leaders, especially innovative projects with the potential to achieve national goals.

It is hoped that this conference will contribute to discussions on the above nature in addition to discussions on the important applications of the innovations that will be presented by the keynote speakers and technical paper presenters.

In ending my message, I would like to thank all those involved in making this two-day conference a reality. I would also like to wish all present at the conference a pleasant and memorable experience.

Thank you.

PROFESSOR DR. FAISAL RAFIQ MAHAMD ADIKAN.

Message from,

The Dean
School of Electrical & Electronics Engineering
Universiti Sains Malaysia

First of all, I would like to extend a warm welcome to all guests, speakers and delegates to the 11th International Conference on Robotics, Vision, Signal Processing and Power Applications (ROVISP) 2021, organized by the School of Electrical and Electronic Engineering, Universiti Sains Malaysia.

The theme that has been chosen for this conference is "Enhancing Research and Innovation through the Fourth Industrial Revolution (IR 4.0)". The goal of the conference is to provide an open forum for researchers to present and discuss their latest innovations not only from the technological perspective but also from the research perspective. Technological outputs from research and innovation contribute directly to the well-being of individuals and society in general. In a wake to face the Fourth Industrial Revolution, clarion call for action has been made from The Government to secure the future of manufacturing industry and its related services. The policy, upheld by a comprehensive philosophy of A-C-T (Attract-Create-Transform), brings forth the importance of enhancing research and nurturing innovations to be IR 4.0-ready. We, need to be ready.

I sincerely hope that all participants will enjoy the keynote speeches and technical papers that will be presented in this conference amidst the natural settings of the conference venue. My sincerest gratitude to everyone contributing to this conference including the organizing committee from School of Electrical & Electronic Engineering, USM, the international advisory committee, the keynote speakers, the sponsors, paper presenters, and paper reviewers. May God reward you with goodness.

Thank you.

PROF. IR. DR. MOHD FADZIL BIN AIN

Message from,

Conference Chairman
ROVISP 2021

It is with great pleasure to welcome all of you virtually to the 11th International Conference on Robotics, Vision, Signal Processing and Power Applications (ROVISP) 2021, which is organized by the School of Electrical and Electronic Engineering, Universiti Sains Malaysia.

Recalling history, ROVISP was inaugurated in 1994 and had been organized ten times via physical conference with huge success and increased participations. As they say, the good show must go on. Exceptional times call for exceptional means. Despite the uncertainties, we are honoured to gather renowned scholars, researchers, experts and thinkers from all over the world to our conference. Thanks to virtual technology for making it viable for us to meet and share with a united aim of disseminating the latest research of various disciplines in the area of Electrical and Electronic Engineering. A total of 172 papers will be presented concurrently alongside with our virtual exhibition which is making its proud debut in collaboration with JOBREWARDS (Malaysia's Most Rewarding Job Platform).

"Enhancing Research and Innovation through the Fourth Industrial Revolution (IR 4.0)" is the conference theme this year. Thus, this virtual conference comes with a solidarity hope of bridging a new networking platform for all parties that are of related concern towards this superb agenda.

I would like to express our gratitude to the notable keynote speakers: Professor Dr. Tharek Abd Rahman from Universiti Teknologi Malaysia (UTM), Professor Dr. Weiliang Xu from University of Auckland, New Zealand and Professor Dr. Abdelhamid Rabhi from University of Picardie Jules Verne, France. Deepest appreciation also goes to our sponsors from TENAGA NASIONAL, NATION GATE, GLOBETRONIC TECHNOLOGY SDN BHD and TERAS TECHNOLOGY.

Also, a special mention of appreciation to our committed collaborator, JOBREWARDS for setting up the virtual exhibition platform throughout the two-day ROVISP conference. We also want to thank SPRINGER publisher for publishing the proceedings. May the readers could enjoy the gain some valuable knowledge from it. Forgetting not, a special thank you shout out to the team of resilient organizing committee of ROVISP2021.

Last but not least, our greatest appreciation to all participants for making this ever virtual ROVISP2021 a happening academia event. We hope that our first virtual conference of ROVISP2021 would provide a good opportunity for the academic faculty members, researchers, engineers, and professionals to meet and expound their research findings and discuss possible future collaborative works. Have a good and productive conference.

Thank you.

ASSOC. PROF. DR. DZATI ATHIAR RAMLI

CONFERENCE ORGANIZING COMMITTEE

CHAIRMAN
DZATI ATHIAR RAMLI

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OPENING CEREMONY SCHEDULE

Day 1: Monday, 5 April 2021

TIME	EVENT
8:00 – 8:20	Arrival of VIPs/guests/delegates USM Engineering Campus Auditorium
8:20 – 8:40	Opening Ceremony ▪ Negaraku & Menara ILMU ▪ SEEE Video ▪ Virtual Platform Video ▪ Doa recitation
8:40 – 8:50	Opening Remarks by ROVISP Conference Chairman ▪ Assoc. Prof. Dr. Dzati Athiar Ramli
8:50 – 9:00	Welcome Speech by SEEE Dean ▪ Prof. Ir. Dr. Mohd. Fadzil Ain
9:00 – 9:10	Remarks by JobRewards Founder & CEO ▪ Mr Adam Tan
9:10 – 9:20	Officiate Ceremony by USM VC • Prof. Dr. Faisal Rafiq Mahamd Adikan
9:20 – 9:45	Souvenir Presentation, Photo Session, Opening Ceremony ends

CONFERENCE SCHEDULE

Day 1
Monday, 5 April 2021

TIME	EVENT
8:20 – 9:45	Opening Ceremony
9:45 – 10:00	Coffee break
10:00 – 10:30	Keynote 1 • 4G to 5G Technology: Evolution or Revolution (Prof. Dr. Tharek Abd Rahman, Universiti Teknologi Malaysia, Malaysia)
10:30 – 11:00	Keynote 2 • RoSE: A Robotic Soft Esophagus for Endoprosthetic Stent Testing (Prof. Dr. Weiliang Xu, University of Auckland, New Zealand)
11:00 – 13:00	Technical Session 1
13.00 – 14.30	Lunch
14:30 – 15:00	Keynote 3 • Autonomous vehicle, modeling and control approaches (Prof. Dr. Abdelhamid Rabhi, University of Picardie Jules Verne, France)
15:00 – 17:00	Technical Session 2
17:00 – 17:15	Coffee break

CONFERENCE SCHEDULE

Day 2
Tuesday, 6 April 2021

TIME	EVENT
8:45 – 10.45	Technical Session 3
10:45 – 11.00	Coffee break
11.00 – 13.00	Technical Session 4
13.00 –14.30	Lunch
14:30 – 16.30	Technical Session 5
16.30 –16.40	Closing Ceremony

KEYNOTE SPEAKER 1

PROFESSOR DR THAREK ABD RAHMAN

4G to 5G Technology: Evolution or Revolution

Universiti Teknologi Malaysia

tharek@fke.utm.my

Over the past few decades, there has been significant progress made to mobile communication networks. The LTE Advanced (4G) as mobile broadband offers huge potential to service providers, application developers, and wireless consumers. Beyond 4G, which also known as 5G, enable the long-term Networked Society and realised the vision of unlimited access to information and shared data available anywhere and anytime to anyone and anything. 5G mobile networks are designed to meet various customer requirements and demands. The introduction of 5G mobile networks open a wide range of business opportunities and use cases. The features for 5G include enhanced mobile broadband, low latency and massive Internet of Things (IOT).

The lecture will include the future services, key requirements, and enabling technologies that will herald in the 5G era that is expected to revolutionise the way we experience mobile services.

KEYNOTE SPEAKER 2

PROFESSOR DR WEILIANG XU

RoSE: A Robotic Soft Esophagus for Endoprosthetic Stent Testing

The University of Auckland

p.xu@auckland.ac.nz

Soft robotic systems are well suited for developing devices for biomedical applications. A bio-mimicking robotic soft esophagus (RoSE) is developed as an *in vitro* testing device of endoprosthetic stents for dysphagia management. Endoprosthetic stent placement is an immediate and cost-effective therapy for dysphagia caused by malignant esophageal strictures from esophageal cancer. However, later stage complications, such as stent migration, could weaken the swallow efficacy in the esophagus. The stent radial force (RF) on the esophageal wall is pivotal in avoiding stent migration. Due to limited randomized controlled trials in patients, the stent design and stenting guidelines are still unconstructive. To address the knowledge deficit, we have investigated the capabilities of the RoSE by implanting two stents (stent A and B) of different radial stiffness characteristics, to measure the stent RF and its effect on the stent migration. Also, endoscopic manometry on the RoSE under peristalsis has been performed to study the impact of stenting and stent dysfunctionality on the intrabolus pressure signatures (IBPSs) in the RoSE, and further its effects on the swallowing efficacy. Each implanted stent in the RoSE underwent a set of experiments with various test variables (peristalsis velocity and wavelength, and bolus concentrations). In this study, the conducted tests are representative of the application of RoSE to perform a wide-ranging assessment of the stent behavior. The usability of RoSE has been discussed by comparing the results of stent A and B, for various combinations of the test variables mentioned earlier. The results have demonstrated that the stiffer stent B has a higher RF, whereas stent A maintained its RF at a low profile due to its lesser stiffness. The results have also implicated that a high RF is necessary to minimize the stent migration under prolonged peristaltic contractions in the RoSE. For the manometry experiments, stent A slightly increased the IBPS, but the stiffer stent B significantly decreased the IBPS, especially for the higher concentration boluses. It was found that if a stiffer stent buckles, it can reduce the swallow efficacy and cause recurrent dysphagia. Therefore, RoSE is an innovative soft robotic platform that is capable of testing various endoprosthetic stents, thereby offering a solution to many existing clinical challenges in the area of stent testing.

KEYNOTE SPEAKER 3

PROFESSOR DR ABDELHAMID RABHI

Autonomous Vehicle, Modelling And Control Approaches

University of Picardie Jules Verne

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The technological advances of recent years have favored the emergence of intelligent vehicles making it possible to predict and compensate for a failure (of the driver, vehicle or infrastructure) or even to ensure autonomous driving. Much is expected of the autonomous vehicle. That it allows us to move everywhere, all the time, without effort or additional cost, that it is available at the click of our fingers, that it transports us in a safe, fast, and non-polluting way, from one end to another city or country. If this revolution is a revolution in uses, it is also and above all a revolution in research and industry.

This note presents an overview of autonomous vehicles and more specifically of modeling and control strategies. The modeling approach will be presented and detailed. We will present the different models used in the literature. The control problem is then studied and several strategies are considered (local, global and mixed). The application of robust nonlinear control approaches gives the fleet a better controlled and more robust behavior in the face of uncertainties. Then, we present a contribution to the control and observation of the state of the system

TECHNICAL SESSIONS

5 APRIL 2021

	Time	Room A	Room B	Room C	Room D	Room E
	Track	**VIS**	**RCMA**	**EEI**	**VIS**	**TSA**
Session 1	**Chairperson**	AP Dr Syed Sahal	Dr Wan Rahiman	Dr Mohd Khairunaz	Dr Muhammad Firdaus	Dr Aeizaal Azman
	11:00 – 11.15	1570672865	1570680116	1570692898	1570698303	1570695666
	11:15 - 11:30	1570675609	1570694022	1570694168	1570698313	1570693277
	11:30 - 11:45	1570692830	1570694031	1570696268	1570697169	1570693751
	11:45 - 12:00	1570694114	1570694311	1570698675	1570694508	1570694102
	12:00 - 12:15	1570695564	1570694966	1570697889	1570696275	1570695360
	12:15 - 12:30	1570696586	1570695773	1570698847	1570696307	1570695422
	12:30 - 12:45	1570697003	1570696020	1570698995	1570698773	1570695426
	12:45 - 1:00	1570698959	1570696417			1570695586
	Time	**Room A**	**Room B**	**Room C**	**Room D**	**Room E**
	Track	**VIS**	**RCMA**	**IS**	**CIT**	**TSA**
Session 2	**Chairperson**	AP Dr Khoo Bee Ee	AP Dr Zuraini	AP Dr Junita	Dr Mohamad Khairi	Dr Mohamed Fauzi Packeer
	3:00 - 3:15	1570696243	1570696578	1570695878	1570692479	1570677741
	3:15 - 3.30	1570696308	1570696743	1570696445	1570692811	1570696138
	3:30 - 3:45	1570697303	1570698009	1570698186	1570696125	1570696191
	3:45 - 4:00	1570698397	1570698324	1570698826	1570697305	1570696575
	4:00 - 4:15	1570698532	1570698738	1570693855	1570697890	1570698979
	4:15 - 4:30	1570695686	1570698929	1570694772	1570698985	1570698933
	4:30 - 4:45	1570695687	1570698963	1570695285		1570695768
	4:45 - 5:00	1570695752	1570699667	1570699832		1570698951

TECHNICAL SESSIONS

6 APRIL 2021

	Time	Room A	Room B	Room C	Room D	Room E
	Track	**VIS**	**RCMA**	**EEI**	**EDA**	**TSA**
	Chairperson	Ir. Dr Teoh Soo Siang	AP Dr Asrulnizam	Ir. Dr Nor Asiah	Dr Nur Zatil Ismah	AP Dr Mohd Fadzli
Session 3	**8:45 - 9:00**	1570698908	1570699820	1570698747	1570695428	1570694422
	9:00 - 9:15	1570698935	1570699821	1570695096	1570697318	1570695786
	9:15 - 9:30	1570698950	1570696302	1570698859	1570698312	1570695879
	9:30 - 9:45	1570698964	1570695883	1570696331	1570699367	1570698004
	9:45 - 10:00	1570699623	1570699433	1570696893	1570693822	1570698945
	10:00 - 10:15	1570694013	1570699328	1570698681	1570694857	1570698981
	10:15 - 10:30	1570696199	1570696695	1570698659	1570695136	
	10:30 - 10:45	1570698325		1570697013	1570696126	

	Time	Room A	Room B	Room C	Room D	Room E
	Track	**VIS**	**RCMA**	**IS**	**BEA**	**EEI**
	Chairperson	AP Dr Haidi	Mr Zulfiqar	Mr Mohd Nadzri	Dr Mohd Ilyas	Ir. Dr Teh Jiashen
Session 4	**11:00 – 11.15**	1570696538	1570692492	1570699002	1570698350	1570694224
	11:15 - 11:30	1570698527	1570693919	1570699131	1570699110	1570696295
	11:30 - 11:45	1570698714	1570695788	1570699822	1570698631	1570698692
	11:45 - 12:00	1570692359	1570696525	1570695427	1570699000	1570698661
	12:00 - 12:15	1570698957	1570696610	1570698413	1570696163	1570695861
	12:15 - 12:30	1570696311	1570698278		1570698703	1570695864
	12:30 - 12:45	1570696411	1570699664		1570691520	1570696141
	12:45 - 1:00	1570696297	1570696388			1570696142

TECHNICAL SESSIONS

6 APRIL 2021

	Time	Room A	Room B	Room C		
	Track	**VIS**	**VIS**	**COMBINE**		
	Chairperson	Dr Ahmad Nazri	Prof Ir. Ts. Dr Shahrel Azmin	Dr Intan Sorfina		
Session 5	**2:30 - 2:45**	1570697306	1570698810	1570696630		
	2:45 - 3:00	1570697652	1570698904	1570698903		
	3:00 - 3:15	1570697683	1570698931	1570699540		
	3:15 - 3:30	1570693734	1570699239	1570699715		
	3:30 - 3:45	1570694638	1570699754	1570698816		
	3:45 - 4:00	1570698603	1570696183	1570698988		
	4:00 - 4:15	1570698608	1570697444	1570694450		
	4:15 - 4:30	1570694516	1570698948			

Track	Details
VIS	Vision, Image and Signal Processing
RCMA	Robotics, Control, Mechatronics and Automation
EEI	Electrical Powers, Energy and Industrial Applications
EDA	Electronic Design and Applications
TSA	Telecommunication System and Applications
IS	Intelligence Systems
CIT	Computer and Information Technology
BEA	Biomedical Engineering and Applications

LIST OF ABSTRACTS

TECHNICAL SESSION 1

VIS: VISION, IMAGE AND SIGNAL PROCESSING

1570672865 Detection of Void Areas on Single Pad X-Ray Images Using Deep Convolutional Neural Network

Muhammad Amin Khalis Mohd Azran; Nor Ashidi Mat Isa; Lay Ngor Lim; Seng Yew Lim

Manual detection of void of single pad in x-ray images is time consuming and too subjective as the detection performance depends on human skills and knowledge. Thus, automated defect detector could ease the inspection and assist the workers to improve the detection performance of voids or defects. Motivated by this issue, this research proposes a void detection system based on x-ray images using deep convolutional neural network (DCNN). Three datasets of x-ray images namely Kb-data, Sc-data and Bb-data were obtained from ViTrox Technologies Sdn. Bhd. Those images are first augmented through rotating and mirroring processes to obtain more images to assist the training of DCNN for better detection performance. Then, the original x-ray images and their ground truth images (showing the locations of voids) are fed into UNet DCNN for segmentation process of void areas. The results show that the developed system has successfully produced accuracy of 94.57%, 97.53% and 98.58% for Kb-data, Sc-data and Bb-data respectively. Furthermore, the average computational time for voids areas segmentation for a single x-ray image is 1.5 seconds, 93.75 milliseconds and 0.15 seconds respectively shorter than manual detection which takes 6 seconds in average.

1570675609 Detection of Void Regions in Single Pad X-Ray Images Using Image Processing Approach

Ahmad Najib Abdullah Norhairi; Nor Ashidi Mat Isa; Harsa Amylia Mat Sakim; Lay Ngor Lim; Seng Yew Lim

Manual inspection methods are performed by inspectors of the company to detect voids in single pad X-ray images using image processing. This manual procedure is subjective and time-consuming. The purpose of this project is to design a detection system for void areas in single pad X-ray images. Three stages of image processing are applied in this study. The image acquisition stage involves two activities namely single pad X-ray images acquisition and image editing activities. During the pre-image processing stage, the contrast of the single pad X-ray images are enhanced. The Adaptive Histogram Equalization (AHE) method has been found as the best technique for the en-hancement stage. Finally, during the image processing stage, the segmentation process has been applied to detect the void regions. Then, the detected void regions have been distinguished from the other regions using the thresholding technique. Based on 20 single pad X-ray images, the qualitative analysis showed that the proposed void detection system has the capability to segment void regions, and this could assist company inspectors to improve inspection.

1570692830 Performance Analysis of Voice Activity Detector in Presence of Non-Stationary Noise

Rahul Kumar Jaiswal

Speech is degraded in the presence of background noise. The need to detect the presence of voiced segments accurately in the degraded signal is crucial for many speech processing applications. This paper addresses the problem of separation of speech and non-speech (noise/silence) segments under non-stationary noisy environments by means of Voice Activity Detector (VAD). A VAD detects the speech and non-speech segments by extracting the speech features and comparing it to a threshold. In this paper, the VAD algorithms are based on two speech features: energy and spectral centroid. NOIZEUS speech corpus containing speech degraded by non-stationary noises at four different SNRs are used. The performance of the VAD algorithms is evaluated using F-score and Euclidean distance with comparison to the Ground truth VAD. Results demonstrate that for different noise conditions tested, a weighted spectral centroid VAD achieves outstanding performance.

1570694114 A Computer Vision Based Assessment System for Electrical Installation Training

Fikret Ercan

This paper describes application of computer vision techniques and algorithms to develop an automated assessment system for worker training. Building and Construction Authority of Singapore ensures that buildings in Singapore are designed, constructed and maintained to high standards of safety through its building regulatory system. Workers in building and construction industry needs certification for the required technical skills. Workers go through a training and an assessment process for their qualification. During assessment, trainees are expected to deliver a given task such as making an electrical wiring and installation in a given time period. The quality of the work produced is then examined by a team of experts. However, evaluation is done manually/visually by experts which makes the assessment a very time consuming process. System described in this paper incorporates computer vision techniques for the assessment process reducing significant man hour during assessment.

1570695564 Object Detection with Few-Shot Learning and Data Augmentation

Hui-Fuang Ng; Yee Fu Lian; Chih-Yang Lin; Hung-Khoon Tan

Deep learning based object detection techniques require large amount of training data and long training time. However, the availability of large annotated image dataset is usually limited and expensive to generate. Moreover, training with large dataset is slow and thus not suitable for real-time applications such as video surveillance which need to learn to detect new object categories or adapt to environmental changes quickly. In this paper, a framework is proposed for object detection with little data samples using few-shot learning and data augmentation. The proposed framework adopts the meta-learning paradigm where a base detection network first learns to extract meta-features from the base classes with abundant training samples and then an adaptation network is trained to generate class-specific weights to adapt the meta-features to detecting novel object classes using only a few support samples. Moreover, data augmentation is applied on the support set to boost the detection performance further. The proposed framework shows superior few-shot object detection performance over state-of-the-art methods on benchmark dataset.

1570696586 A Hybrid Deep Learning Model for Face Sketch Recognition

Hussein Samma; Shahrel Azmin Suandi; Junita Mohamad-Saleh

This paper introduces a hybrid deep learning model which integrates particle swarm optimization (PSO) with VGG-face deep learning network for face sketch recognition problem. Particularly, the proposed hybrid model incorporates PSO into VGG-face to find the best filters of the last layer that have the highest contribution in face sketch recognition. In addition, PSO performs fine-tuning for the selected filter to enhance recognition rate accuracy. To assess the performances of the proposed hybrid model, LFW face sketch benchmark images are used in this study. Reported results show that PSO can reduce VGG-face model complexity and increase recognition accuracy to 76% on LFW benchmark images.

1570697003 Dorsal Hand Vein Segmentation Using Vein-Generative Adversarial Network (V-GAN) Model

Marlina Yakno; Junita Mohamad-Saleh; Mohd Zamri Ibrahim

Difficulty in achieving intravenous access in some patients is a clinical problem due to extreme age, body size, and chronic disease patients. In another area in biometric identification, hand vein patterns can be used, as other external identifiers are more likely to be damaged or forged. To overcome these problems, near-infrared dorsal hand vein images are captured and segmented for vein extraction. However, the segmentation process becomes more challenging when the infrared images suffer from extremely low contrast and distortion, indirectly affecting the segmentation process. Therefore, this work presents a method that generates the precise map of dorsal hand vein patterns using deep learning Vein-Generative Adversarial Networks (V-GAN). The performance of V-GAN is measured in terms of accuracy, Area under Curve (AUC), F1-score, sensitivity, specificity, and dice-coefficient.

1570698959 Study of VGG-19 Depth in Transfer Learning for COVID-19 X-Ray Image Classification

Qusay Hamad; Hussein Samma; Shahrel Azmin Suandi; Junita Mohamad-Saleh

Modern-era largely depends on Deep Learning (DL) in a lot of applications. Medical Images Diagnosis is one of the important fields nowadays be-cause it is related to human life. But this DL requires large datasets as well as powerful computing resources. At the beginning of 2020, the world faced a new pandemic called COVID-19. Since it is new, shortage of reliable datasets of a running pandemic is a common phenomenon. One of the best solutions to mitigate this shortage is taking advantage of Deep Transfer Learning (DTL). DTL would be useful because it learns from one task and could work on another task with a smaller amount of dataset. This paper aims to examine the application of the transferred VGG-19 to solve the problem of COVID-19 detection from a chest x-ray. Different scenarios of the VGG-19 have been examined, including shallow model, medium model, and deep model. The main advantages of this work are two folds: COVID-19 patient can be detected with a small number of data sets, and the complexity of VGG-19 can be reduced by reducing the number of layers, which consequently reduces the training time. To assess the performance of these architectures, 2159 chest x-ray images were employed. Reported results indicated that the best recognition rate was achieved from a shallow model with 95% accuracy while the medium model and deep model obtained 0.94 and 0.75, respectively.

1570698303 Under Insulation Microwave Non-Destructive Testing Using Dual-Ridges Open-Ended Rectangular Waveguide

Shin Yee Tan; Muhammad Firdaus Akbar

Composite materials emerged as a promising class of engineering materials, providing new prospects for modern technology. However, manufacturing defects, including the improper laying of laminae, low curing tempera-ture and pressure applied to the insulation materials can cause a growth of delamination between the insulation and the metal surface and crack of metal. Such defects could dramatically reduce the strength and stiffness after impact. Hence, it becomes essential to report and repair the area non-destructively be-fore it spreads any further. In this paper, a novel of microwave non-destructive testing (NDT) technique for composite coatings is proposed. This technique is based on scanning the surface of the coating with a dual-ridges open-ended rectangular waveguide. The reflection coefficient is analysed. Here, a sample with miniatured delamination is scanned using rectangular waveguides operating from 6.5 to 18 GHz. After applying Wavelet transform to the waveguide reflection coefficient, the surface plot showed the delamination with significantly better depth resolution. The results reported in the paper illustrates the advantages of Wavelet transform to picturise the delamination depth. The information of depth defects can be used to further develop improved methods for maintenance schedule involving significant localised damage and for checking in a production quality control system.

1570698313 Embedded Facial Mapping: Tracking Facial Expressions with Limited Hardware

Ali Ahmadinia; Kyle Zampell

In today's markets, facial detection technologies are making great strides forward in accuracy and speed, continuously pushing the limitations of computerized vision and offering ever-increasing opportunities for automation and machine learning in what was once a human-dominated concept. But while the accuracy of these systems increases, so do their computational requirements and complexity. Compounding the problem, advancements in hardware have not held the same rapid pace. Researchers now face the very real possibility that their algorithms will be bottlenecked by the very hardware it runs on. While we may be able to run current programs on current hardware, the idea of pairing a full-sized computer with a single camera does not scale well in terms of current or future applications. The goal of this paper is to examine one component of facial recognition software: facial expression detection and evaluation, working to maintain a certain level of ac-curacy while functioning on hardware that is significantly weaker in computational power relative to the modern desktop workstation.

1570697169

A Comparative Analysis of Euclidean-Support Vector Machine

Kenneth Kean Hoong Tan; Yee Wan Wong; Michelle Tien Tien Tan; Hermawan Nugroho

Support vector machines (SVMs) are a class of machine learning algorithms which use kernel functions to map data into feature space, where a separating hyperplane can be computed to classify the data. Generally, SVMs are reliant on the selection of kernel function and parameters, which can severely downgrade the performance of the classifier if mishandled. In this paper, we compare the performance of the Euclidean-SVM (ESVM), that have low dependency on kernel selection, with conventional SVM. The comparison are conducted with two different datasets. Results show that the ESVM has higher performance consistency as compared to SVM.

1570694508

Deep Learning for Diabetic Retinopathy (DR) Classifier

Sin Hui Kho; Syamsiah Mashohor; Marsyita Hanafi

High prevalence in diabetes has been contributes to the rising of the complications such as diabetic retinopathy (DR) which cause the patient to suffer from vision loss and this vision loss may become permanent if it is not well manage and treat. Including other medication non-adherence factor, this rising trend has been made more challenging for physician in keep apace with demand using manual method of retina screening to diagnose DR. Therefore, this project aimed to develop a classifier of deep learning for DR in 5 different level of severity which are normal (no DR), mild, moderate, severe and proliferative DR, to speed up the clinical assessment for early DR detection or DR monitoring progression of disease. The classification was applied using Scottish grading with consider three categories for fundus abnormalities which are hemorrhage, lipid exudates and microaneurysms for a training from scratch model and a pre-trained model using Inception V3. Verified and trustable dataset of retina screening or fundus image available online such as kaggle.com used to train and test of the system. Besides, the execution of this project was completed via on cloud training using Google Cloud Platform (GCP). The obtained results are measuring the classifier performance tested in term of accuracy, sensitivity, and specificity. Transfer learning using Inception V3 has been shown a better performance compare to own training model with accuracy 81.2% using transfer learning Inception V3 and 74.1% for own training model.

1570696275

Respiratory Anomalies & Diseases Detection with Deep Learning

Min Kang Chew; S. Anandan Shanmugam; Hermawan Nugroho

This paper explores the deep-learning based analysis of respiratory auscultation audios. We focus on two tasks: i) respiratory anomaly classification and ii) respiratory diseases detection. For each task, a novel deep learning model is proposed and evaluated based on ICBHI benchmark dataset of respiratory sounds. Results indicate that both our proposed architectures outperform the models in previously published papers.

1570696307

Development of COVID-19 Prediction Models from Chest X-Ray Using Transfer Learning

Shaline Koh Jia Thean; Marwan Nafea; Hermawan Nugroho

Due to the outbreak of corona virus disease (COVID-19) globally, many countries are facing shortages of testing kits and medical resources. Moreover, the current COVID-19 swab test cannot easily perform due to asymptomatic patients. To assist the medical staff, few studies have proposed to detect and classify COVID-19 cases by analyzing radiological images. In this paper, we aim to develop an alternative method using chest X-ray images to provide an automatic and faster diagnosis. Convolutional neural network models that can detect the presence of COVID-19 and pneumonia infection from chest X-ray images are developed by exploiting transfer learning techniques. Three models were developed for comparison, the models yielded an accuracy of 97.3%, 98.2%, and 97.3% respectively.

1570698773

Smart Traffic System: Detection of the Emergency Clearance

Mohamad Tarmizi Abu Seman; Haziq Khairam

The number of vehicles is increasing leading to traffic congestion. This hap-pen when the rate of incoming vehicle is faster than the rate of leaving vehi-cle at that traffic junction. The slow-moving traffic denied the main func-tionality of the traffic light which is to control and smoothen the traffic flow. It led to blockage of emergency vehicle pathway contributing to the loss of life due to the late arrival of the emergency vehicle. The proposed system is to control flow of the traffic with help of the IR sensors. The RFID technol-ogy were used to help in the early detection of the emergency vehicle and clear the lane emergency vehicle. Only the authorized emergency vehicle will be recognized. If the emergency vehicle signals detected, the traffic will record the data of the emergency vehicle and store to the Cloud server. As the result, this system will reduce the traffic congestion as it operates in the optimize way and reduce the probability of deaths during the emergency. This system provides the automatic decision-making traffic light for deter-mining which lane, the timing of the light duration and enables the smooth travel for the emergency vehicle which help it arrive at the destination on the estimated time.

RCMA: Robotics, Control, Mechatronics and Automation

1570680116 Mathematical Modeling of Self Balancing Robot and Hardware Implementation

Faiza Gul; Wan Rahiman

Two wheel self-balancing robots are an area of review that may provide the future locomotion for everyday robots. The unique stability control feature which keeps the robot upright differentiates it from all other traditional forms of robots. The inverted pendulum principle provides the mathematical modeling of unstable system. This is then utilized to develop and implement a suitable stability control system that is timely, responsive and successful in achieving the entire objective. Self-balancing robot is primarily based on the principle of inverted pendulum, which are supported by wheels for back and forth movement for its balancing. Mechanical model primarily based on the design of the cart. To find its strong inverted position, a feedback controller (i.e. PID controller) is used. Mechanical design encompasses dc motor, controller and MPU sensor. They decide the force needed to balance the robot up.Initially the robot will keep its balance and will be more flexible when get pushed suddenly, it also has the tendency to overpass the obstacles which came its way. The robot has importance to maintain its balance even when the weight is put on. Completing the development and design phase of the robot requires a very careful consideration of all aspects including operating conditions, materials, hardware, sensors and software. The robot will be prevented from falling through giving acceleration to the wheel keeping its inclination angle from the vertical. If the robot gets tilted by an angle, than within the body of the wheels; the center of mass of the robot will experience a force which will in turn observe a torque opposite to the tilt and robot will rebalance itself

1570694022 Semi-Automatic 3D Metal Deposition Machine Based on Wire Arc Additive Manufacturing (WAAM)

Zarirah Karrim Wani

Several methods of manufacturing can produce 3D printing. One of the methods to produce a 3D object, particularly within the manufacture of metal, is 3D welding. The paper is meant to present the concept of a semi-automatic reconfigurable 3D welding machine. Here within the manufacturing methods, the discussion on the identification of parts and their purpose, design for assembly mentality, the cad modeling, and fabrications stages, and preliminary observation of the operation are included. The feed rate of welding used in this study is 200 and 1000 mm/rev. It's found that the physical appearance and height of the welding bead on the sheet metal are plagued by the feed rate set up. It is also found that the time consumes to produce certain profiles is different depends on the size, shape, and feed rate. Time-consuming to develop a simple profile is very momentary. To conclude, a semi-automatic or automatic 3D welding machine shows the capability of helping to come up with a better product and productivity for the 3D part created.

1570694031 Enhance Robotic Process Automation Using a Rule-Based Approach

Chia Chuan Wu; Selvakumar Manickam; Wei Seng Yeap; Kevin Yeap Khai Wen

Robotic Process Automation (RPA) is an important research area in the revolution of industrial 4.0 throughout the world. RPA technology can increase manufacturing productivity and reduce cost in the long term. One of the most important facts that exist in existing RPA systems are they are platform dependent. It must be used in a general-purpose operating system environment and cannot be applied to other software systems such as embedded software or BIOS. RPA then captures a screenshot of the desktop graphical user interface display, analyzes the image, determines the next steps or process and then prompts the user to act as keyboard and mouse. This proposed an RPA solution with the intelligence to offload the high processing task via edge or cloud, based on a set of rules. The ability to decide when to offload tasks is the key factor to increase the adoption rate of the industry. This process will be done based on a set of rules. This type of programable rules-based RPA system is essential to provide a wide range of industry needs. The prototype RPA operated on a rulesbased approach has demonstrated that it is possible to apply it to different operating industries.

1570694311 An Automatic Light Control System for Camera Barcode Reader

Mohammed Abdulhakim Bantahar; Samir Al-Gailani; Ali Ahmed Ali Salem

The aim of the present paper is to develop a novel lighting control system for camera barcode reader. Barcodes are printed on several products and applications which create reading problems when a conventional camera barcode reader is used to scan these barcodes. This problem emerges as a result of uneven light and reflection on the barcode surface. To overcome this problem, an automatic light control system is prominent. The study carried out in this paper is to design a unique system that will automatically control the light intensity of the camera back light based on the barcode conditions that is being scanned. The system has been designed in such a way that, the camera lens captures the barcodes and sends an appropriate signal to the light control circuit to perform suitable actions. In this study, an Arduino Uno board is used as a controller unit to implement light control strategies. Laboratory experiments had been conducted to validate the efficiency of the designed automatic light control circuit.

1570694966 Kalman Filter-Based Fault Detection Scheme for Antenna Azimuth Position Control System

Masood Ahmad; Rosmiwati Mohd-Mokhtar

Fault detection (FD) is an essential requirement for any engineering process to ensure its safety and reliability. DC motor-based servo system is an integral part of the position control system (PCS) in antenna-based communication systems. A sensor FD problem in a linear model of DC motor subjected to Gaussian noise is addressed in this paper, to ensure the reliability of PCS. The model-based Kalman filter approach is adopted to design the FD system because of its ability to generate the unbiased estimate of system output in sense of least mean square estimation error. In this approach, residual is generated utilizing Kalman filter and residual is evaluated and compared with the threshold to indicate the occurrence of the fault. In the end, a simulation example is provided to validate the effectiveness of the proposed Kalman filter-based FD approach.

1570695773 Experimentation of Magnetorheological Piston Damper

Wan Rahiman; Nuradlin Borhan

Magnetorheological (MR) fluid is a smart liquid where its properties can be controlled by the presence of magnetic field. There are two types of experiment conducted for this project which are, sedimentation test and static test. The purpose of sedimentation test is to study the different composition of MR fluid and decide which the best MR fluid mixture is. The performance of original damper and MR damper can be studied from static test. Permanent magnet is utilized in order to generate a magnetic field as opposed to an electromagnet due to safety precaution. With the presence of magnetic field, the MR damper when in active and passive state are investigate.

1570696020 Survey on Meta-Heuristic Algorithms for Solving Vehicle Route Problems in a Waste Collection System

Thaeer Sahib; Rosmiwati Mohd-Mokhtar; Azleena Mohd Kassim

Population growth, rapid urbanization, industrialization, and economic development have led to an increase in municipal waste generation at a dangerous rate globally. Thus, priority and attention should be given to this sector by developing an effective waste collection process while saving time, fuel, and maintenance costs. This paper aims to present a survey of the municipal waste management system regarding the waste collection stage, constraints on municipal waste, and methods. Various types of improvement objectives and decision variables are highlighted to improve waste collection and reduce cost. Moreover, this survey has classified the improvement methods available to provide understanding to readers. Besides, future research gaps were identified by investigating the available issues and main challenges of the current methods.

1570696417

UAV Control System with Time to Collision (TTC) Prediction Capability

Sulaiman Sabikan; Sophan Wahyudi Bin Nawawi; Nor Azlina Ab. Aziz

This paper presents the development of an Unmanned Aerial Vehicle (UAV) control system simulation with collision avoidance prediction capability using the Time-to-Collision (TTC) model. TTC is the time required for a UAV either to collide with any static obstacle or completely stop without applying any braking control system when the throttle is fully released. Flight mission data collected from the quadcopter testbed platform experiments in the real environment in order to develop TTC model. The horizontal ground speed, throttle magnitudes, and flight time stamp are downloaded from the onboard quadcopter, filtered, analyzed, and optimize using Particles Swarm Optimization (PSO) algorithm to find the optimal TTC model. This model provides predictions of time before UAV will collide with the obstacle in the same path based on their current parameters, for instance, current speed and payload. This development of UAV's control system implemented in Matlab / Simulink. The PID-based controller is utilized to stabilize the quadcopter and collision avoidance control systems with the TTC model to assist the system in order to avoid a collision from happening. Simulation tests performed proved the capability of UAV to stop at a safe distance and avoid collisions with the obstacles that existed based on TTC model prediction during flight successfully.

EEI: Electrical Powers, Energy and Industrial Applications

1570692898 Modelling of High Frequency Coreless Planar Transformer with TWR Hexagonal Winding

Mohd Nadzri Mamat

Coreless planar transformer is one of the most efficient transformer designs to be used in very high frequency switched mode power supply design especially for power supply in package. Coreless planar transformer has a very good response time when operated at frequency greater than 1MHz. It has theoretically zero core losses, higher coupling coefficient, simple fabrication method and relatively lower cost compared to conventional transformer to be built. This paper presents the modelling and optimization of a coreless planar transformer design using variable track width with a constant Track-Width-Ratio (TWR). TWR is an effective and popular method to control the electrical parameters in coreless planar design by minimizing winding parasitic parameters, winding resistance and winding leakage inductance. TWR also defines how the trace width of each turn should change when approaching the outer radius of the windings. Modelling and simulation of the coreless planar transformer is designed using finite element software, Ansys Maxwell 3D at 5MHz frequency. Simulation results show that the proposed design with TWR has lower leakage inductance and winding resistance, and also higher coupling coefficient compared to uniform width design.

1570694168 Model Predictive Control for Induction Motor Fed by 5-Level Cascaded H-Bridge Inverter

Norjulia Nordin; Abobaker Kikki Abobaker

One of the most exciting and challenging problem is the control of induction machines (IMs). An advanced control strategy with a three-phase in-verter to drive an induction motor (IM) is a conventional model predictive control (MPC). However, the use of a conventional MPC 3-phase inverter leads to the generation of extensive harmonic content due to a limited voltage vector, result-ing in high ripples of torque and flux. Besides, it is complex to calculate the weighting factor by error and select it for three different objectives. However, this paper aims to give a review of the development of MPC in multilevel in-verter. Therefore, it proposes simple technique with a multilevel cascaded high bridge inverter for predictive torque and flux control to drive IM with lower har-monic content in stator current without using the weighting factor to optimize the MPC cost function. One cost function for the torque and a decupled cost function for the flux are used in this method. In terms of current distortion, it is expected to improve steady-state performance, achieve even better dynamic performance, and decrease torque and flux ripples.

1570696268 New Level Increasing Technique for Symmetrical Multilevel Inverter with Reduced Number of Components and Total Standing Voltage

Muhammad Najwan Hamidi; Dahaman Ishak; Chia Ai Ooi

In this paper, a new technique to increase the number of output levels of symmetrical multilevel inverter (MLI) with reduced number of components and total standing voltage (TSV) is proposed. The main advantage of the suggested technique is the lower number of additional components needed to produce any higher output levels compared to the originally introduced cascade technique. Using the old cascade technique, 20 power switches and gate drivers are needed to produce 17 output levels. With the proposed level increasing technique, only 18 power switches and 14 gate drivers are required. The conducted simulation studies successfully demonstrate the operation of the topology using the new level in-creasing method in generating 17 output levels. Under purely resistive load, the output voltage and current waveforms share similar pattern and total harmonic distortion (THD) which is at 4.84%. With resistive inductive load, the current lags the voltage waveform with its THD effectively reduced to only 0.40% while the voltage THD remains.

1570698675 Breakdown Voltage of PFAE Containing Non-Bridged and Bridged Cellulose Fiber Under Lightning Impulse Stress

Sarizan Bin Saaidon; Nor Asiah Muhamad; Mohamad Nur Khairul Hafizi Rohani; Mohd Aizam Talib; Mohamad Kamarol Mohd Jamil

This research investigated the influence of cellulose bridging skeleton on the breakdown strength of Palm Fatty Acid Easter (PFAE) under Standard Lightning Impulse Voltage (SLIV). A commercial cellulose fiber of 20µm size is selected as artificial contaminants in PFAE oil. The concentration of the cellulose contamination is 0.004wt%. The standard lightning impulse of 1.2/50 µs is generated from a single stage test transformer and the waveform is applied according to the IEC60897 to obtain the breakdown voltage. The cylindrical test cell fitted with spherical-spherical configuration with 0.5mm gap is utilized to generate the quasi-uniform field between the electrodes. The cellulose bridging skeleton is created artificially under a DC electric field by using a +10kV DC power supply and its microscopic optical digital images of the bridge forming process is observed and captured via microscope fitted with HD camera. Theexperiment results show that the cellulose contamination without bridges reducing the breakdown strength by 4.5% from the clean oil. The breakdown strength curtailment of PFAE become more prominent when the bridge skeleton is observed between the electrodes gap, where the curtailment is by 27.96% from the clean oil. The simulation results revealed that the presence of cellulose fiber distorted the field lines and at the same time, it created own non-uniformity flux line on the cellulose fiber surface and surrounding. The high field stress and high intensity also obtained between individual cellulose fiber that are potential to lead a local breakdown nearby the fiber.

1570697889 Effect of Harmonics Current on the Performance of Current Transformers

Noramalina Abdullah

Accurate measurement of harmonic voltage and current are extremely important for correct evaluation of harmonic emission. Harmonic currents or voltages are generated from a non-linear load when it is connected to the main supply. Many problems caused by harmonic that can influence the efficiency of a system. A laboratory method is implemented to determine the emission level of harmonic current with the presence of current transformers. Current transformer is been used for this analysis and some test are been conducted to ensure proper current transformers operation. Each current transformer is tested with several stages of harmonic until it is saturated. It is found that the current transformers have a point known as the saturation point of the transformers. The output of the current transformers should be synchronized with its ratio. A ratio of 7.5/1A is the smallest ratio that can be obtain from the lab and the output should obey the ratio given because some test has been conduct to ensure proper operation of the current transformer. So, if the output gain is different from the ratio, harmonics are present in the system. With this finding, the proposed method can be improved to gain a better system operation in the future.

1570698847 Electrical Tree Inception Voltage and Propagation in XLPE Containing Silica Nanofiller

Nazatul Shiema Moh Nazar; Noor Syazwani Mansor; Umar Khayam; Amir Izzani Mohamed; Nor Asiah Muhamad; Mariatti Jaafar Mustapha; Mohamad Kamarol Mohd Jamil

This paper presents the tree inception voltage and electrical tree propagation in XLPE containing silica nanofiller. The concentration of silica nanofillers in XLPE was 0 wt%, 0.5 wt%, 1.0 wt%, 1.5 wt% and 1.75 wt%. The result of tree inception voltage and the electrical tree propagation in XLPE contain-ing silica nanofiller was compared with pure XLPE composite. The silica nanofiller with the concentration of 1.5 wt% revealed the higher TIV and slower propagation of electrical tree in the XLPE nanocomposite.

1570698995

Effect of Pressure Drop on the Performance in a Multi-Stage Fluidization System

Mohd Al-Hafiz Mohd Nawi

Commonly, a fluidization systems is applicable to the mining, power generation and chemistry industries. New application that can improve the fluidization efficiency on bed by using an annular blade distributor known as Swirling Fluidized Bed (SFB). This present study concentrated on the blades number of 30 with the impact of three horizontal inclinations angle (10°, 12° and 15°) at each blades distributor. In order to analyze the performance of the multi-stage fluidization system, the Computational Fluid Dynamics (CFD) simulation analysis was per-formed to investigate the pressure drop at each parameter of the annular blade distributor. The present study has found that the energy is conserved and the performance system is kept highly efficient when using a multi-stage fluidization system. The findings of this study shows that at 15° blade inclination angle with 30 blades number may reduce the pressure without interfering with performance and for the velocity profile it would propose a velocity uniformity in the fluidization systems.

TSA: Telecommunication System and Applications

1570695666

Combined Role of Material Composition and Thickness of Activated Carbon/Natural Rubber Composite Microwave Absorbers in the Absorption of Within the 1 - 18 GHz Frequency Range: A Review

Roslina Hussin; Mohd Nazri Mahmud; Mohd Fadzil Ain; Shahanawaz Kamal; Abdullahi SB Mohammed; Mohamad Faiz Mohamed Omar; Mohd Ahmad; Zulkifli Mohd Ariff; Nor Zakiah Yahaya

There is a rising prospect for producing more efficient, widely affordable and eco-friendly microwave absorbers. Much research has demonstrated the efficacy of low-cost absorbers, particularly those made of sustainable carbonaceous and rubber-based materials structured into a hollow pyramidal shape. Natural rubber possesses outstanding resilience, tensile strength, resistance to tear, and ability to combine with activated carbon, enhancing absorption within the 1 GHz to 18 GHz frequency range. However, activated carbon/natural rubber composite absorbers' performance, encompassing its absorption bandwidth, weight, and strength, remains suboptimal due to problems in manipulating their material composition and thickness simultaneously. Their combined role is obscured by investigations that employ one factor-at-a-time (OFAT) experimental approach, which can highlight only their individual roles. Nevertheless, these investigations promote the idea that if the material composition and thickness can be simultaneously manipulated, then the overall performance might be optimized. This paper reviews the relevant studies on microwave absorbers that involve investigation on their material composition and thickness. This review contributes to promoting the potential of studying the combined role of material composition and thickness for generating outcomes of novel formulation of composite materials, novel specifications of dimension and novel theory for mechanisms of microwave absorbers

1570693277

Assessment of Monthly Rain Fade in the Equatorial Region at C & Ku-Band Using MEASAT-3 Satellite Links

Nur Hanis Sabrina Suhaimi

C & Ku-band satellite communication links are the most commonly used for equatorial satellite communication links. Severe rainfall rate in equatorial regions can cause a large rain attenuation in real compared to the prediction. ITU-R P. 618 standards are commonly used to predict satellite rain fade in designing satellite communication network. However, the prediction of ITU-R is still found to be inaccurate hence hinder a reliable operational satellite communication link in equatorial region. This paper aims to provide an accurate insight by assessment of the monthly C & Ku-band rain fade performance by collecting data from commercial earth stations using C-band and Ku-band antenna with 11 m and 13 m diameter respectively. The antennas measure the C & Ku-band beacon signal from MEASAT-3 under equatorial rain conditions. The data is collected for one year in 2015. The monthly cumulative distribution function is developed based on the 1-year data. RMSE analysis is made by comparing the monthly measured data of C-band and Ku-band to the ITU-R predictions developed based on ITU-R's P.618, P.837, P.838 and P.839 standards. The findings show that Ku-band produces an average of 25 RMSE value while the C-band rain attenuation produces an average of 2 RMSE value. Therefore, the ITU-R model still under predicts the rain attenuation in the equatorial region and this call for revisit of the fundamental quantity in determining the rain fade for rain attenuation to be re-evaluated.

1570693751

Analysis of the Proposed Boundary Conditions for the Conductive Material and Substrate Thickness of Air-Substrate Microstrip Patch Antenna via Graphical Verification Method

Abdullahi SB Mohammed; Shahanawaz Kamal; Mohd Fadzil Ain; Roslina Hussin; Fathul Najmi; Zainal Arifin Ahmad

In the preparation of a microstrip patch antenna, the selection of the conductive radiating material, substrate material, and their thicknesses are extremely crucial. Therefore, a designer should possess a good understanding of the antenna output effect upon varying the conductive radiating and substrate materials, as well as their thicknesses. The primary aim of this paper is to disclose the boundary condition concerning the effects of different conductive material and substrate thickness on the center frequency (1 - 40 GHz), bandwidth, gain, and efficiency of a low profile, and cost-effective antenna operated using air substrate at a bandwidth range of 1 - 40 GHz for 5G applications. The boundary conditions of $0.001 \leq h_s \leq 1$ and $0.0001 \leq h_c \leq 2$ were developed for substitute height and conductor thickness, respectively. Novel mathematical modeling equations of patch length and width are also presented in this paper.

1570694102 Bandwidth Enhancement of Branch-Line Crossover Using Etching Slot Technique for Butler Matrix

Nazleen Syahira Mohd Suhaimi; Nor Muzlifah Mahyuddin

In this paper, a proposed wideband 0 dB crossover using RO4003C substrate and copper conductive material is presented. Rectangular and square ground slots are introduced to improve the bandwidth performance. The coupling of 0 dB ± 1 dB, return loss and isolation better than 10 dB fractional bandwidth (FBW) for the proposed wideband 0 dB crossover with slotted ground is in the frequency interval between 5.9 GHz and 7.1 GHz which stands for 18.46% compared to 14.02% within 5.9 GHz and 6.79 GHz for the 0 dB crossover without any ground slots. The bandwidth enhancement without changing the original circuit area are realized in this work.

1570695360 The Three-Stage Non-Blocking Switch for Elastic Optical Networks

Aeizaal Azman Abdul Wahab

In this paper, a new design of the three-stage elastic-optical switching fabric is proposed. The proposed switching fabric consists of three stages, the first one and the second are comprised of space switches, while the third-stage contains switches that are provided with the spectrum conversion capability. The results showed that this switching fabric can have non-blocking operation in the strict-sense using lower number of spectrum converters as compared to other known switching fabrics that are implemented with other orders of space/wavelength stages.

1570695422 PAPR Reduction OF OFDM System Using Partial Transmit Sequence (PTS) and Firefly Algorithm (FA)

Aeizaal Azman Abdul Wahab

Orthogonal Frequency Division Multiplexing (OFDM) is an encoding method that are huge-ly utilized in wireless communication due to its high number of advantages such as toler-ance for multipath delay spread, frequency selective fading channels immune and also power efficiency. The bad side of this method is it has high Peak Average Power Ratio (PAPR) that will generate nonlinear distortions and severe power penalty. In this research, Partial Transmit Sequence (PTS) method is proposed to solve the problem of high PAPR but from previous research, it could be seen that in PTS, the search complexity increases as the number of phase sequence increase. To solve this issue, Firefly Algorithm (FA) is applied to optimize the function of PTS. The modulation method used is Quadrature Phase Shift Key-ing (QPSK). By the end of the process, CCDF plots are computed. The performance of PAPR reduction in OFDM system are analyzed by different number of subcarriers, phase sequences and iterations using CCDF graphs. By using PTS method only, the PAPR values manage to be reduced by 7 to 7.2 dB but with FA-PTS algorithm, the PAPR values can be reduced by 9 to 9.4 dB. With these results, it is concluded that the combination of PTS with FA can help to improve computational complexity in PTS and eventually reduce PAPR value in OFDM system.

1570695426 An Improvement on Partial Transmit Sequence (PTS) for PAPR Reduction in OFDM System

Aeizaal Azman Abdul Wahab

Orthogonal Frequency Division Multiplexing (OFDM) is a modulation technique include multicarrier and become the basis technology applied to the telecommunication field. The information about user carried by a subcarrier is transmitted in each band. OFDM own many advantages which are suitable for high speed data transmission, such as high data rates, high spectral efficiency, robustness to channel fading and immunity to impulse interferences. The major drawback that OFDM suffers is the high peak to average power ratio (PAPR). To transmit the signal with high PAPR, the high power scope amplifiers are needed. Hence, there are several PAPR reduction technique introduced to reduce the PAPR of the OFDM system. PTS technique is one of the PAPR reduction technique. So, the PTS-Clipping technique is used to improve the PTS technique for PAPR reduction. Based on the simulation result, the PAPR of the PTS-Clipping technique have been further reduced by 2.56dB compared with PTS technique for 512 subcarriers, four subblocks and under 16-QAM at a clipping rate of 10^(-3). As the order of modulation increase, the PAPR for both techniques will also increase. When the number of subblocks increased, the PAPR of OFDM system will decrease.

1570695586

A Compact MIMO Antenna for Wideband Circularly Polarized mmWave Communications

Shahanawaz Kamal; Abdullahi SB Mohammed; Mohd Fadzil Ain; Ubaid Ullah; Fathul Najmi; Roslina Hussin; Mohamad Faiz Mohamed Omar; Zainal Arifin Ahmad

In this paper, a multiple-input multiple-output (MIMO) antenna for 36 GHz mmWave communications is presented. The antenna configuration includes two radiators having the similar profiles. These radiators are positioned diagonally on opposite sides of the antenna assembly to generate circular polarization. Furthermore, each radiator is loaded with a port placed at the optimized location to achieve good radiation efficiency and gain. In order to accomplish wide bandwidth, decrease mutual coupling between radiators and reduce the fabrication cost, air was utilized as the substrate. The antenna engaged an overall area of 35 mm^2 to successfully realize bandwidth > 3 GHz, mutual coupling up to −19 dB, radiation efficiency of ~60%, gain of ~8 dBic, envelope correlation coefficient (ρ_eij) < 0.008 and diversity gain of ~10 dB.

TECHNICAL SESSION 2

VIS: VISION, IMAGE AND SIGNAL PROCESSING

1570696243 Analysis of Plant Stress Response Using Hyperspectral Imaging and Kernel Ridge Regression

Mohd Shahrimie Mohd Asaari

The optical signature of a plant is an essential tool in predicting vegetation water content for quantitative assessment of plant status under drought stress. Plant responses to water stress may involve optically-complex reactions, thus a more sophisticated learning algorithm is needed for accurate prediction. This study proposes Kernel Ridge Regression (KRR) algorithm, a simple yet effective nonlinear learning method to uncover the complex relationship between the response variable and input spectra. A prediction model was developed by calibrating the normalized spectral in Short-Wave-Infrared (SWIR) with the leaf Relative Water Content (RWC) values. The predicted model was applied to a time-series of Hyperspectral images (HSI) of maize plants for early detection of drought stress. RWC was estimated for every plant pixel, and the histogram representation was constructed to characterize the whole plant. Discrimination between healthy and stressed plants was achieved by means of the histogram similarity measure. Further, a One-Way Analysis of Variance (ANOVA) was applied to test the significance of the discrimination between healthy and stressed plants. The proposed method successfully detected drought stress from the fifth day of drought induction, confirming the potential of HSI for drought stress detection studies.

1570696308 Behavioural Study of Constrained Convolutional Neural Network on Image Splicing Classification of Various Datasets

Yang Yang Lee; Teck Seng Kong; Bee Ee Khoo

The Internet nowadays is exploded with digital images. However, it is also equally having more forged images floating around and threaten the digital asset trustworthy, especially spliced images. Although there are many computational ways of detecting image splicing, since the image splicing technique is advancing over time, driving feature specific algorithms to obsolete. Thus, more researchers nowadays are focusing on data-driven feature extraction. Convolutional Neural Network (CNN) is a Deep Learning algorithm well known for object detection, but it is ill-suited for manipulation feature extraction. In this research, a constrained convolution algorithm is to be injected into a simple CNN to study its performance in image splicing detection in a wide range of datasets. With a strategic parameter tweaking, it can fit a wide range of spliced image datasets but it is always biased to its train dataset. A cross-database splicing classification shows that it is ill-suited for generalizing a wide range of dataset evaluation.

1570697303

Passive Acoustic Monitoring (PAM) of Snapping Shrimp Sound Based on Blind Source Separation (BSS) Technique

Fatin Izzati Mohamad Abdul Hadi; Dzati Athiar Ramli; Ahmad Saiful Azhar

The study of underwater acoustic signal has become a great contribution to scientific and environmental technology. This paper explores feasibility of separating a target signal which is snapping shrimp sound from mixed underwater sound for Passive Acoustic Monitoring (PAM). Blind Source Separation (BSS) based on Independent Component Analysis (ICA) was proposed while Kurtosis and Negentropy formulations were used to measure the components' non-Gaussianity. From the experimental results, Negentropy appeared to be more superior to Kurtosis in circumventing the interference and distortions. Signal-to-Interference-Ratio (SIR) and Signal-to-Artefact Ratio (SAR) performances for Negentropy were observed as 65.62db and 36.22db, respectively. Hence, separating the snapping shrimp sound from the mixed underwater sound based on BSS is promising.

1570698397

Fruit Ripeness Classification with Few-Shot Learning

Hui-Fuang Ng; Jie Jin Lo; Chih-Yang Lin; Hung-Khoon Tan; Joon Huang Chuah; Kar Hang Leung

Deep learning based image classification systems require large amount of training data and long training time. However, the availability of large annotated image dataset is usually limited and expensive to generate, which limits a vision system to adapt to new task efficiently. In this paper, a few-shot classification framework is proposed which can adapt one fruit ripeness classification system to classify new types of fruits using only a few training samples. The proposed framework adopts the meta-learning paradigm where a base network learns to extract meta-features and few-shot classification tasks from the base classes with abundant training samples and then apply the network to similar task on the novel classes using only a few support samples. Experimental results indicate that the proposed framework is able to achieve over 75% ripeness classification accuracy on various fruits using a little as five samples.

1570698532

Sorted Uniform Local Binary Patterns

Cem Kalyoncu

Sorted Uniform LBP (SULBP) is a rotation invariant Local Binary Patterns (LBP) variant that is proposed for leaf image identification. This method is simple and effective, and is shown to outperform other LBP variants in leaf recognition. However, comparative analysis of this method in terms of texture classification is limited. In this paper, we present our extensive comparative analysis of SULBP. Additionally, we have explored different parameters of this system and their effect on the performance. Finally, we have used multiple datasets and classifiers to show the validity of these experiments..

1570695686 Lung Nodules Detection Using Inverse Surface Adaptive Thresholding (ISAT) and Artificial Neural Network

Haniza Yazid; Khairul Salleh Basaruddin; Tharathan Gunasegaran

Early detection of lung nodules is important since it increases the probability of survival for the lung cancer's patient. Conventionally, the radiologists will manually examine the lung Computed Tomography (CT) scan images and determine the possibility of having malignant nodules (cancerous). This process consumes a lot of time since they have to examine each of the CT images and marking the lesion (nodules) manually. In addition, the radiologist may experience fatigue due to large number of images to be analysed. Therefore, automated detection is proposed to assist the radiologist in detecting the nodules. In this paper, the main novelty is the implementation of image processing methods to segment and classify the lung nodules. In this work, several image processing methods are utilized namely the median filter, histogram adjustment, Inverse Surface Adaptive Thresholding (ISAT) to segment the nodules in CT scan images. Then, 13 features are extracted and given as input to the Back Propagation Neural Network (BPNN) to classify the image either benign or malignant. Based on the result obtained, it showed that ISAT segmentation achieved 99.9% in term of accuracy. The extracted features were given as input to the Back Propagation Neural Network (BPNN) to classify the image either benign or malignant. Lung nodules that are less than 3mm are considered as benign (non-cancerous) and if their size is more than 3mm, there are considered as malignant (cancerous). The results showed that the proposed methods obtained 90.30% in term of accuracy.

1570695687 Comparison Between K-Nearest Neighbor (KNN) and Decision Tree (DT) Classifier for Glandular Components

Haniza Yazid; Muhammad Juhairi Aziz Safar

Prostate cancer is one of the most common cancers in men, and the cases of this disease is increasing. Histopathological examination of prostate cancer is one of the main procedures for prostate cancer detection. The structural changes of the cytoplasm, stroma, lumen and nucleus in the glandular tissue will indicate the presence of cancerous or non-cancerous areas in the histopathology of prostate cancer. Therefore, a framework was developed to automatically segment and classify glandular tissue into cytoplasm, stroma, lumen, and nucleus, which can reduce the complexity of prostate cancer detection. The images under-went image enhancement using histogram equalization (HE) and Contrast Limited Adaptive Histogram Equalization (CLAHE). Then, in segmentation phase, K-means clustering (KMC) and multi-level thresholding (MT) methods were implemented to segment the enhanced image into cytoplasm and stroma, lumen and nuclei regions. A total of 8 feature vectors are extracted from each segmented image. All these features were introduced into the classification system namely K nearest neighbor (KNN) and decision tree (DT). The overall results showed that the performance of KNN is better than DT with an accuracy of 86.67%, sensitivity and specificity are both 100% (the features of the KMC category). With the features of MT category, KNN achieved 84.44% in term of accuracy, 100% sensitivity and 96.67% specificity. Here, it can also be concluded that the features of the KMC category are more suitable for the classifiers. In addition, leave-one-out cross-validation has been implemented, which can improve the performance of the two classifiers.

1570695752

Analysis on Clustering Based Method for Diabetic Retinopathy Using Color Information

Haniza Yazid; Shafriza Nisha Basah; Fathinul Syahir Ahmad Saad; Muhamad Khairul Ali Hassan

Diabetic Retinopathy (DR) is an important global health concern and it can causes blind-ness. Early detection and treatment can prevent the patients from loss their vision. This study presents an approach of color image segmentation for automatic exudate detection. The color retinal images are converted into four different color spaces and preprocessed by applying Contrast Limited Adaptive Histogram Equalization (CLAHE). Fuzzy C-Means (FCM) and K-means clustering (KMC) algorithms are applied on the preprocessed image for the segmentation purpose. Then, optic disc is detected and eliminated by using Circular Hough Transform (CHT). Performance evaluation of developed algorithm is done using Structured Analysis of the Retina (STARE) dataset. The proposed algorithm achieved sensitivity of 93.4 % for STARE datasets for LUV color space with KMC.

RCMA: Robotics, Control, Mechatronics and Automation

1570696578 Automatic Detection of Cerebral Ischemia (Cerebral Occlusion) by Using Frame Differencing Method

Zin Htun

This paper presents a simple, useful, and effective cerebral ischemia (cerebral occlusion) detection technique. Cerebral ischemia is the major cause of stroke. It is one of the main causes of mortality and disability in infants and adults, therefore its timely diagnosis is essential for an efficient treatment. The task of detecting cerebral ischemia by Magnetic Resonance Imaging (MRI) is faced by current medical imaging research in today. MRI is used because it is more effective than other scans such as Computed Tomography (CT), Positron Emission Tomography (PET), etc. at detecting abnormalities in small structures of the brain. Time-Of-Flight MRI data detection of cerebral ischemia is of great importance in analyzing, diagnosing, and treating cerebrovascular pathologies in the blood supply structure. Sometimes human eyes cannot be easily distinguished the intensity of MRI images. To detect cerebral ischemia, the segmentation of blood vessel MRI images accurately is important. The objective of this paper is to diagnose whether the patient suffers the cerebral ischemia (in the circle of willis) or not. This paper presents a comprehensive review of the methods and techniques used to detect cerebral ischemia. The analysis of the results shows 90% detection accuracy in 367 images.

1570696743 Safety Device for Runners (SDR) Using Arduino Microcontroller

Kuryati Kipli; Rohana Sapawi

This paper describes the design of a safety device for runners using Arduino microcontroller. The prototype device is used to notify the runners oncoming obstacles such as animal or vehicle that can pose danger. Ultra-sonic sensor HC-SR04 will transmit sound signal and receive back echoes' if it detects any presence of obstacle behind the user. LEDs are placed beside the sensor to alert the drivers that the runner is in front of them as well as to improve the visibility of the runner. Another feature of this device is as a tracking system to detect the location of the user. It consists of (GPS) and GSM module. The GPS will communicate with the satellite at every five seconds to determine the user's location and the GSM module will send the user's location via SMS. This device has been successfully tested in terms of distance, objects, sensitivity of sensor and tracking location.

1570698009 A New Concept of Inter-Robot Interaction: An Application on NAO Humanoid Robot

Tareq Mahmoud; Muhammad Nasiruddin Mahyuddin

This article presents an example of human-robot Interaction, and robot-robot Interaction in detailed steps using a new platform called RemoRobo. Sending commands and messages between heterogeneous Robots is challenge because of different manufacturers and platforms, by using Python, Raspberry Pi and socket programming, we can extend the power of robots, such as controlling and sending messages between touchscreen and robots such as NAO robot movements and extends the capabilities of robots.

1570698324 Optimization of PD Controller Based on ARMAX Model for Vapor Compression Refrigeration System Using R600a Refrigerant

Wan Azani Mustafa; Mohd Saifizi Saidon

The research undertaken in this paper is to investigates the difference in approaches to the modelling, design and implementation of an adaptive controller tuned using ARMAX 2,1,1 model in an environment simulated in SIMULINK, applied to a variable speed compressor vapor compression refrigeration system running R600a refrigerant. A vapor compression refrigeration system is chosen for this paper research as it's the most commonly used type of refrigeration system in all over the world, either for domestic, commercial or industrial application. The refrigeration system consists of a condenser, an expansion valve, an evaporator and a compressor which are modified from a fixed speed compressor to a variable speed compressor. The compressor was modified to be able to accommodate the usage of R600a refrigerant. R600a refrigerant has a thermophysical properties which can roughly be define as a slight change in pressure will result in a drastic change in temperature [1]. To be able to control the pressure for R600a with precision, an optimized adaptive controller is re-quired. For the purpose of the simulation, the refrigeration system mathematical model is simplified to a linear polynomials ARMAX model. This is to reduce the complexity of the control design strategies, which in term improve the implementation of the new controller design. The optimization of the adaptive controller design, its simplicity of implementation, speed of convergence and robustness are concluded at the end part of the paper.

1570698738 Response Time Reduction of Internet of Things (IoT) Based Flood Alert System

Zuraini Dahari

Flood disaster is the most common yet dangerous natural disaster in Malaysia. Lots of early flood warning systems have been developed recently to alert the public. However, there are less researchers focused on the analysis of the time response of delivering the alert message. In this project, an accurate, low-cost and real-time flood alert system is developed. An ultrasonic sensor is used to detect the water level and interfaced with the Raspberry Pi for sensing and transmitting the alert message to the user through smartphone's application, which is Telegram messenger. The time response for delivering the alert message is calculated through software programming. The accuracy and effectiveness of this system is demonstrated by the results of the experiments. In addition, this research mainly emphasized on improving the time taken between sensing and sending the alert message through different types of programing techniques, which are structured programming technique and event-driven programming technique. The result is then compared and analyzed in this report. Moreover, a custom designed of mobile application is developed via Blynk apps for monitoring purpose. The reliability and robustness test of the apps are conducted as well. It is believed that many lives could be saved with the implementation of this system by improving the time response for sensing and delivering the alert message with the presence of internet.

1570698929 Interactive System for Maintenance of Automatic Test Equipment on the IC Production Floor

Trung Hieu Tran; Serge Demidenko; Moi Tin Chew

Maintenance of Automatic Test Equipment (ATE) at a semiconductor manufacturing company is of paramount importance in order to reach production targets while also maximizing profit and productivity. This paper discusses a computer-guided ATE maintenance support system allowing to instantly access the test equipment information from a maintenance history, identify equipment part numbers as well as required spare parts and tools, carry out machine diagnostic while following a preventive maintenance checklist, and performing the required maintenance operations.

1570698963 Holonomic Mobile Robot Planners: Performance Analysis

Yaaqob Aljamali

Many algorithms have been proposed to tackle the path planning problem in mobile robots. Among the well-known and established algorithms are Probabilistic Road Map (PRM) algorithm, A* algorithm, Genetic algorithm (GA), Rapidly-exploring random tree (RRT), and dual Rapidly-exploring random trees (RRT-connect). Hence, this paper will focus on the performance comparison between the aforementioned algorithms concerning computation time, path length, and fail and success rate for producing a path. For the sake of fair and conclusive results, simulation is conducted in two phases with four different environments, namely, free space environment, low cluttered environment, medium cluttered environment, and high cluttered environment. The results show that RRT and RRT-connect have a high success rate in producing a feasible path with the least computation time. Hence, our focus will be directed into RRTs-based sampling algorithms and its variants for further exploration and optimization.

1570699667 Inchworm-Inspired Semi-Autonomous Pole-Climbing Robot

Ahmad Muaz Mohaspa; Wan Othman; Abdul Sattar Din

Robots have been slowly replacing human workforce for heavy-duty and dangerous tasks. One of such tasks is pole climbing, which is energy-intensive and often associated with a high risk of falling. This paper describes the design, fabrication and testing of a pole climbing robot inspired by inchworm. The robot consists of a four-links spine structure with two grippers attached to both ends of the spine. This robot climbs a pole by a two-step rhythmic movement akin to the biological inchworm locomotion. The structure of the robot is designed using Solidworks 3D modelling software. The robot is actuated by five servo motors, which are controlled using an Arduino MEGA microcontroller. A series of experiment was performed to evaluate the pole climbing performance. From the experiments, the robot has successfully climbed up a 3.2cm diameter pole autonomously, stopped at the highest point of the pole, and descended to its starting point. The robot recorded an average speed of 0.487 cm/s from 5 attempts of climbing a 180 cm height pole.

IS: Intelligence Systems

1570695878 Unraveling the Rubik's Cube with Autodidactic Iteration Algorithm

Kevin Yeap Khai Wen; Mohd Nadhir Ab Wahab; Wei Seng Yeap; Chia Chuan Wu

The autodidactic iteration algorithm was designed in hopes of finding an approximate solution to combinatorial optimization puzzles such as the prediction of protein tertiary structures. The prediction of protein tertiary structures allows a better understanding of its function in an organism. The Rubik's cube is selected as a placeholder for the combinatorial optimization puzzle to represent the protein tertiary structures. The autodidactic iteration algorithm is used in environments with large state spaces and sparse rewards such as combinatorial puzzles like the Rubik's cube. This research to solve a classic Rubik's cube using the implementation of the autodidactic iteration algorithm is a reinforcement learning algorithm that can teach itself to solve the Rubik's cube without human assistance. A neural network model is then trained to solve a scrambled Rubik's cube while implementing Keras as the deep learning library. The Rubik's cube is generated in a graphical user interface, GUI using Magic Cube. The Rubik's cube generated in the GUI can be interacted with by turning the faces of the Rubik's cube and changing the viewing angle of the Rubik's cube. The interactive Rubik's cube then uses the neural network model trained based on the model trained to solve a scrambled Rubik's cube.

1570696445 AFSA-SLNO Variants for Enhanced Global Optimization

Norazian Subari; Noorazliza Sulaiman; Junita Mohamad-Saleh

Artificial fish swarm algorithm (AFSA) is a strategy which imitates the natural behavior of fish swarm in the real environment. Many improvements and modifications have been proposed on AFSA to improve its optimization performance. To date, nevertheless, the existing algorithms are still unable to achieve a satisfactory global optimum. This paper presents incorporation of circle updating position from SLnO into AFSA to enhance the robustness and optimum value. Fifteen benchmarks function have been used to evaluate the performance of the proposed variants in comparison to the standard AFSA and SLnO. The proposed variants show better result compared to the standard AFSA and SLnO.

1570698186 Effects of the Number of Network's Order Used in a Higher Order Neural Network on Time Series Prediction

Noor Aida Husaini; Rozaida Ghazali; Nureize Arbaiy; Ayodele Lasisi

Higher Order Neural Networks (HONN) with backpropagation algorithm is conducted for predicting the time series event, which is a challenging problem under investigation. Many factors can affect the results of time series prediction. One of the most important factors is the architecture of a HONN which consists of layer, network's order and output layer. In this study, we are focusing on the numbers of network's order (or hidden nodes for ordinary Neural Network). Other factors are kept unchanged. The network is also tested with few other metaheuristic learning algorithms and compared to Multilayer Perceptron. Experimental results demonstrate that the effects of the numbers of network's order on time series prediction are significant. Together with proper network's order setup, practical analysis of results shows that 5-5-1 for PSNN-MCMC and 6-4-1 for FLNN-MCMC are the optimal network combination of input-hidden-output. The accuracy rate for both network models is around 0.037% to 0.498%.

1570698826 Apex Frame Spotting Using Convolutional Neural Networks with Continuous Labeling

Sie Min Koo; Mohd Asyraf Zulkifley; Berrin Yanikoglu; Nor Azwan Mohamed Kamari

Apex frame is the frame containing the highest intensity changes of facial move-ments in a sequence of video. It plays a crucial role in the analysis of micro-expressions, which generally have minute facial movements. This frame is hard to be identified that requires a laborious and time-consuming effort from highly skilled specialists. Therefore, a convolutional neural networks-based technique is proposed to automate apex frame detection using a novel continuous labeling scheme. The network is trained using ascending and descending labels according to the linear and exponential functions, pivoted on the ground truth apex frame. Two datasets, CASME II and SAMM databases are used to verify the proposed algorithm, where the apex frame is determined according to the maximum label intensity and a sliding window of the maximum label intensity. The results show that a linear continuous label with the sliding window approach produced the lowest average error of 14.37 frames.

1570693855 Improved K-Means Clustering for Initial Center Selection in Training Radial Basis Function Networks

Lim Eng Aik; Wee Choon Tan; Tan Wei Hong; Cheng Ee Meng

Radial Basis Function networks accuracies mainly affected by its center selection from dataset. K-means (KM) clustering is a widely in numerous field for data classification and centers selection. However, initial centers selection poses high impact on KM clustering outcome. It suffers from its immense reliance on the initial centers selection algorithm from the dataset. KM algorithm has been enhanced for its performance from diverse perspectives over the years. Nonetheless, a good balance between quality and efficiency of the centers selected by the algorithm is not attained. To overcome this issue, this paper proposed an improvement on KM clustering algorithm in getting initial centers and reduce its sensitivity to initial centers. This paper introduce the use of improved K-means (KM) clustering that consider the each point distance as probability for selecting the initial centers with radial basis function network (RBFN) training algorithm. The proposed approach uses improved KM for centers selection in RBFN training algorithm shows accuracy improvement in predictions and with simpler network architecture compared to the conventional RBFN. The proposed network called IKM-RBFN was tested against the conventional RBFN, KM-RBFN, back-propagation neural network and long short-term memory neural network in FOREX EURUSD pair price predictions. The results are compared to proposed method on its root mean square error (RMSE) and mean absolute error (MAE) results. The proposed method shows promising results in improving RMSE accuracy over 20 percent in compared to other tested networks.

1570694772 An Innovative TRIZ Insight on the Pilot Test Run Issue in NPI Through Intelligent System

Wei Chien Ng; Teh Sin Yin; Choo Jun Tan; Ping Chow Teoh

ApNew Product Introduction (NPI) is one of the most crucial aspects in every company to survive in a competitive environment. NPI is a process where an initial working prototype is examined and launched in the market. To succeed, companies are required to deliver new products of high quality just in time and with reasonable cost. In the NPI, companies often run pilot test on new products to ensure utmost quality before the products are approved for mass production. However, companies often face dilemma in conducting pilot test because it requires investment of resources in terms of time and cost which could outweigh the benefits. Therefore, companies run a small sample size pilot test or even skip the pilot test due to the tight budget and schedule for mass production. Ideally, pilot test should be run in adequately large sample size to expose and address quality problems before releasing the products to the customers. The objective of this study is to propose a solution for the pilot test issue using Engineering Contradiction in inventive problem solving methodology (TRIZ). TRIZ inventive principle suggests that practitioners can perform simulation using neural network to analyze new products and experiment processes in a virtual setting to gain insights before the real physical testing of the products. The intelligent system derived should provide new insights on the pilot test issue in the NPI.

1570695285 AFCGA as Preferable Intelligent Tuning Method to Reduce the Vibration of Suspended Handle-Power Tool

Chin Siang Chew; Mohamad Syazwan Md Isa; Ahmad Zhafran Ahmad Mazlan

This research investigated different intelligent tuning methods of Active Force Control (AFC) scheme to reduce vibration of suspended handle. The suspended handle emulates power tool handles such as chainsaw and drillers whereby these tools can cause high vibration during operation and might cause health problems to the workers especially when exposed for long period of time. Hence, Active Vibration Control (AVC) is applied to ensure a better health assurance of these workers. Instead of using common Proportional-Integral-Derivatives (PID) controller, AFC is introduced to the AVC system to attenuate vibration and this requires some parameters tuning in order to achieve optimum performance. With PID as basic controller, AFC is added to the system to further improves the vibration control. Several intelligent tuning methods have been simulated in this work such as Crude Approximation (CA), Fuzzy Logic (FL), Iterative Learning Method (ILM) and Genetic Algorithm (GA). As a result, the AFC schemes showed better vibration attenuation compared to the basic PID in most of the cases with different combination of disturbances. Generally, AFCGA generates better response compared to AFCCA, AFCFL and AFCILM. This study proved that AFC can be a good controller applied in the vibration control of industrial power tool devices.

1570699832 A Comparative Study of Sine Cosine Optimizer and Its Variants for Engineering Design Problems

Qusay Hamad; Hussein Samma; Shahrel Azmin Suandi; Junita Mohamad-Saleh

Sine Cosine Algorithm (SCA) is one of the simplest optimization al-gorithms and is used to solve a wide range of problems due to using two simple mathematical equations. However, it faces local optima stagnation because of constraints in its exploration and exploitation mechanism. To solve this prob-lem, many researchers proposed new versions of sine cosine algorithm (SCA). The main concept of developing SCA performance is to add some methods or layers to original SCA, edit the SCA parameters, or only hybridized it with oth-er optimization algorithms to improve SCA's exploration and exploitation. Three constrained engineering design problems were used in this study. The outcomes show that SCA was still able to report a good result more than some of its variants. Further analysis was conducted by comparing SCA with the three new SCA variants.

CIT: Computer and Information Technology

1570692479 A Review on Tools and Techniques for Visualizing Software Requirement Traceability

Wan Mohd Nazmee Wan Zainon

Requirement traceability is the process of following and identifying the life of requirements in forward or backward directions during software development lifecycle or modification. Visualization is used to analyse the whole development process with a graphical notation to show the life of each requirement and help to deliver a quality software system that meet stakeholders' expectations. Due to limitations of existing requirement traceability visualization tools and techniques, their practical use is not widely in use. This paper presents a review study on tools and techniques for software requirement traceability visualization with summary and comparison to reveal their scalability and visual clutter issues. Our findings highlight a comprehensive information and latest developments to academic researchers and practitioners in this domain to help them understand requirement traceability techniques and existing visualization tools.

1570692811 Handling Illusive Text in Document to Improve Accuracy of Plagiarism Detection Algorithm

Zahid Iqbal

Plagiarism Detection is being one of the challenging tasks in academic research world to ensure integrity/authenticity of a document. Currently, many efficient algorithms are available to sufficiently detect the plagiarism in a document. Pre-processing of a document typically remain a master key to achieve maximum stable goal. Although all algorithms, before checking plagiarism, initially perform some sort of pre-processing on documents and convert the document into a particular format like by removing whitespaces and all special characters, etc. In this paper, we focus on two possible techniques, which can be used for plagiarism, which existing plagiarism detection algorithms are omitting. First is replacing the white spaces with a hidden character with white colour (background colour) between consecutive words so apparently, they seem to be distinct words, but algorithm/computer will incorrectly consider them as a single word. So even a 100\% copied statement would not be identified as plagiarised content. Second is hiding spam text behind images to falsely report maximum number of words count in a document but as they are hidden so human eye can't discover them and algorithm will consider them as some words resulting in less percentile score of the plagiarised document. Our proposed (pre-processing) technique can efficiently handle these two critical problems which results in improved accuracy and authenticity of plagiarism checking algorithms. We have compared performance of our algorithm considering these critical issues with other state-of-art algorithm (particularly with Turnitin) and our algorithm handles these issues efficiently.

1570696125 Security - Enhanced MQTT Platform for Green Internet of Things (IoT) Communication

Mohamad Khairi Ishak; Zainatul Yushaniza Mohamed Yusoff

Green IoT is an energy efficient IoT method to reduce the greenhouse effect caused by existing IoT applications. Sensors are used to measure temperatures and humidity to ensure the environment is within healthy specifications. One of the significant issues with providing IoT is device security and device-to-device communication (D2D) .However, the security supports in existing IoT communication protocol are very weak. In this work, we propose a robust and lightweight security protocol for IoT communication system. The study employs Contiki system to simulate and test the Message Queue Telemetry Transport (MQTT) supports Transport Layer Security (MQTT-TLS) security between the CC2650 Sensortag and the collector system. In addition, default MQTT offers channel-to-broker encryption only because after MQTT-TLS broker; data can still be exposed. ACL is also impractical because of the growing number of rules for approving large IoT devices. To solve this problem, one master key called a Secure Private Identification (SPID) will be created using Elliptic Curve Cryptography (ECC) to encode the generate key to avoid spoofing attacks. A simple simulation demonstrates the effectiveness of the proposed security protocol.

1570697305 Analysis of Smart IOT Portal Based on Advanced RISC Machines (ARM) Processor for Fanless Heat Maintenance

Mohd Nizam Mohd Najib; Dzati Athiar Ramli

Internet of things or familiarly known as IOT is an interconnection of things together in a digital world. By 2025, it is estimated that there will be about 21 billion of IOT devices existed in the world. This huge number of devices will require a portal to connect with the world. Currently, most of the portal that is available is based on Complex Instruction Set Computer (CISC) microprocessor. This type of microprocessor generates a lot of heat. The portal which is based on CISC requires a fan to disperse heat from the microprocessor. The fan requires regular maintenance and periodic replacement. By using ARM processor, the fan usage can be eliminated. The ARM processor usually generates less heat than CISC. The fan is suitable to be replaced with a system that will be able to conduct the heat from the processor via a heat conductor to the portal enclosure. An experiment comparing two ARM processors was carried out. The first ARM pro-cessor was a basic unit without a heat dispersal system and the second one was tested with a heat dispersal system. The heat reduction of about 20% was recorded in the unit with the heat dispersal system although the processor was running at high performance. From the results of the experiment, the developed system is proven to have reliable maintenance.

1570697890 Internet of Things with RFID Based Microcontroller for Monitoring System

Noramalina Abdullah

Most of the current attendance systems in schools are based on manual data entry, which is time-consuming. Over the last few years, the demand of radio frequency identification (RFID) systems has been an increase in the number of applications in different areas. This research developed an RFID system that uses a microcontroller to monitor students has been developed. An Arduino microcontroller was programmed to facilitate automatic wireless identification using electronic passive tags. The system is suitable for the readers based on RFID technology. As the information was stored in external memory and the database was created using MySQL, the Arduino-based RFID system was linked to an Android application. Four passive tags containing student information were used to test the system, whereby the system was only able to detect one tag at a time. Data manipulation and retrieval occurred via a graphical user interface (GUI). System that embedded with RFID technology for student monitoring can eliminate time wasted during the manual collection of attendance. It also offers an opportunity for administrators to record activities and timetables.

1570698985 Functional Requirements for Talent Management System - A Case of Performing Arts Freelancers in Malaysia

Nurhidayah Bahar; Kasthuri Subaramaniam; Adnan Masoud; Abdul Samad Bin Shibghatullah; Mohd Helmy Abd Wahab

This study examines job seeking and hiring process between freelancers and agency or event organizer in performing arts industry in Malaysia. The main aim of this study is to develop a set of system functional requirements for Talent Management System - a job portal that can be used to automate and computerized job seeking and hiring process. To achieve the aim, the study employed a qualitative research approach and followed an object-oriented analysis and design with the Unified Process methodology. A total of 10 interviews were conducted with freelancers, agencies, and organizers to gain an in-depth understanding of the process, constraints, and concerns about the current practice. The finding from this study highlighted the important system's functions and provides guidelines on the system design and implementation. Hence, it offers some insights to the system developers who will be working on a similar system. Additionally, this study adds some knowledge to the literature related to talent management system and performing arts. Future studies may want to further design the data access layer, system interfaces, controls, and security.

TSA: Telecommunication System and Applications

1570677741 Simple Compact UWB Vivaldi Antenna

Sahar Saleh; Widad Ismail; Intan Zainal Abidin; Mohd Haizal Jamaluddin; Mohammed H Bataineh; Asem Alzoubi

Simple compact Ultra Wide Band (UWB) Vivaldi Tapered Slot Antenna (VTSA) is presented in this paper. The proposed antenna shows good impedance matching less than -11.283 dB though 3.325 GHz - 10.82 GHz with high gain up to 7.63 dBi. The antenna circuit area is 43.92 mm x 35.32 mm. The proposed antenna with compact size, end fire radiation pattern, wide band width and high gain make it suitable for UWB communication systems applications such as remote sensing and trough wall detection. The simulation in this paper is carried out using Computer Simulation Technology (CST) software which based on Finite Integration Technique (FIT).

1570696138 Effects of Integration Time on Rain Rate Distribution for Microwave Link Design

Md Rafiqul Islam; Mullah Momin; Md Moktarul Alam

Rain fade is the main constraint for microwave propagation at higher frequencies. To design microwave link, it contributes significantly specially in tropical region. All rain attenuation prediction models require rain intensity data based on 1-minute integration time. Rain intensity data was collected at International Islamic University Malaysia with 10-seconds integration time for one year period. The measured intensity was converted to 20-sec, 30-sec, 1-min and 2-min integration time to investigate the effects of integration time on rain rate distribution prediction as well as rain attenuation prediction models and the results are presented in this paper.

1570696191 Nearly Zero Ultra-Flattened Dispersion in Octagonal Photonic Crystal Fiber

Anik Bau; Mohamed Fauzi Packeer Mohamed; Naeemul Islam

In this research, a comprehensive study has been conducted in the design of a novel octagonal PCF (Photonic Crystal Fiber) microstructure with an ultra-flattened dispersion profile through a vast range of optical communication band wavelengths with a large negative dispersion of nearly 6635 ps / nm / km at 1550 nm. The guiding features of the fiber have been analyzed numerically to solve the Maxwell equation of electromagnetic field by using full vector finite element method with cylindrically perfect to match layer for strongly absorb the outgoing waves from the computational region. Moreover, Octagonal rings in the cladding region provides better confinement and flattened dispersion in O-band (1260-1360 nm) and C-band (1530-1565 nm) in compare to honeycomb or hexagonal lattice structure. Our proposed model unique nearly zero ultra-flattened dispersion of ± 0.3028 ps/nm/km in a 1290 to 1620 nm with wavelength range (320 nm flat band) and low confinement loss is less than 10-7 dB/km in the entire band of interest. Along with, this research has been presented 7.2 µm2 effective area which is smaller than other reported fibers at 1550 nm wavelength.

1570696575 Design A RFID Tag Antenna for Wearable Application System

Nur Hidayah Ramli; Rashidah Binti Che Yob

This paper proposed a Radio- Frequency Identification (RFID) tag antenna for wearable application. The proposed tag antenna is designed to operates at frequency 1.0GHz to 12GHz. The RFID tag antenna consists of several meander line radiator. The structure of the meandered line radiator is attached on the cotton fabric. Monostatic radar system which consists of Vector Network Analyzer and a horn antenna is configured to test the RFID tag antenna in real life. The performances of RFID tag antenna are evaluated in term of reflection coefficient (S11) and their operating frequency. The results will be guidelines while designing RFID tag antenna in the future.

1570698979 Backlobe Reduction of Air Substrate Circular Patch Antenna for 5G Applications

Zulhaimi Zahar; Mohd Fadzil Ain

A new air substrate circular patch antenna for fifth generation (5G) applications at 28 GHz is proposed as a modification to the conventional air substrate circular patch antenna for improving the backlobe radiation level. The modified antenna contains four cylindrical copper wires surrounding the edges of the circular patch. The parameters that define the radius, length and position of the wires are optimized to obtain a maximum reduction of backlobe radiation level while maintaining the overall antenna performance. The conventional and modified antenna is designed and simulated by using CST Microwave Studio. Simulated results show that the backlobe radiation level is reduced by 13.51 dB in the modified antenna compared to the conventional antenna.

1570698933

2D Physical Modelling of Double δ-Doped pHEMT with Tensile InAlAs Barrier and Compressive InGaAs Channel

Nur Iwana Mohd Ikhwan; Mohamed Fauzi Packeer Mohamed; Muhammad Firdaus Akbar; Nor Azlin Ghazali; Asrulnizam Abd Manaf; Mohd Syamsul; Mohd Hendra Hairi; Alhan Farhanah Abd Rahim

This study focuses on the optimization of fabricated 1 µm gate length depletion-mode double δ-doped In0.3Al0.7As/ In0.7Ga0.3As/InP depletion-mode pHEMT using SILVACO ATLAS TCAD simulator. Physical modelling of the pHEMT devices is required to further understand the effect of the parameters and structures on the device performance, which incorporated a highly tensile In0.3Al0.7As barrier and compressive In0.7Ga0.3As channel. The work starts with developing a base model from the fabricated device DC characteristic such as I-V curves by inverse modelling and matching simulated results with measured results. Finally, to study the effects of channel layer thicknesses and gate length variations, the models are simulated, and the corresponding I-V curves are compared to the base model. Hence, by increasing the channel layer thickness by 15 % from its original thickness and reducing the 1 um gate length by 60 %, the channel layer and gate length were successfully simulated and agreed well with the measured results.

1570695768

Development of 2D Indoor Monitoring and Positioning System (IMPS) Using Received Signal Strength Indicator (RSSI) Assisted by Internet of Things (IoT) Application

Nur Haliza Abdul Wahab; Liza A. Latiff; Sharifah Hafizah Syed Ariffin; Raja Zahilah Raja Mohd Radzi

As humans, nearly eighty percent of our day-to-day activities are conducted in an indoor environment, making indoor tracking and monitoring extremely necessary. The needs of having an Indoor Positioning System (IPS) has become crucial as the development is critically challenged due to the fact that satellite signals via Global Positioning System (GPS) cannot penetrate through a building. Variety techniques and approaches on IPS have been proposed but the most desirable approach used is the Received Signal Strength Indicator (RSSI) due to existing infrastructure already in place to provide a low-cost implementation. Internet of Things (IoT) itself has brought drastic changes and opened new opportunities for growth and innovation in technology. An integration between RSSI and IoT is the perfect combination of the development of IPS to allow an increased accuracy. This paper proposes an Indoor Monitoring and Positioning System (IMPS) using RSSI algorithm and triangulation technique integrated with IoT. The experimental results show that the proposed IMPS has achieved an average accuracy of 0.5m for 2D. Future work has suggested an improvement in the IMPS with AR mapping integrated with Machine Learning.

1570698951

Handling Mobility with Network Virtualization in IoT WAVE Context

Yaarob Al-Nidawi; Sara M Al-Saryia, Sa.; Wisam Haitham Abbood Al-Zubaidi

Realizing robust interconnectivity in a rapidly changing network topology is a challenging issue. This problem is escalating with the existence of constrained devices in a vehicular environment. Several standards have been developed to support reliable communication between vehicular nodes as the IEEE 1609 WAVE stack. Mitigating the impact of security/mobility protocols on limited capability nodes is a crucial aspect. This paper examines the burden of maintaining authenticity service that associated with each handover process in a vehicular network. Accordingly, a network virtualization-based infrastructure is proposed which tackles the overhead of IEEE 1906 WAVE standard on constrained devices existed in vehicular network. The virtualized WAVE architecture migrates the overhead of authentication process to allocated physical resources devised in a logical network. The proposed infrastructure has managed to reduce the WAVE security overhead by 40%. In addition, the handover delay is minimized by 45% as the computation time associated with the authentication process is reduced.

TECHNICAL SESSION 3

VIS: VISION, IMAGE AND SIGNAL PROCESSING

1570698908 Implementation of Fuzzy Gamma Adaptive Histogram Equalization for Penicillium and Aspergillus Species

Farah Zabani

This paper proposes a new approach in image enhancement method to enhance the structure of fungi namely, Penicillium and Aspergillus. The new approach combines the methods of adaptive histogram equalization (AHE), gamma correction and fuzzy logic. Previous methods of enhancing the structure of fungi is barely available as the current conventional method of identifying a fungi species relies on detecting the fungi directly from a microscope instead of examining it in the form of an image. It is widely known that microscopic images of fungi are usually low in contrast. Plus, the structure of fungi is complex and changes according to its level of maturity. Thus, a new approach in image enhancement is investigated to improve the appearance of the structure of fungi. The performance of the proposed method is evaluated on the collected database consisting of 194 microscopic coloured image of fungi. The result obtained shows that the proposed method, Fuzzy Gamma Adaptive Histogram Equalization (FGAHE) has a better performance in terms of enhancing the structure of fungi by obtaining a PSNR value of 14.28 dB, 20.37 dB and 21.60 dB from the species of Penicillium, Aspergillus fumigatus and Aspergillus terreus respectively.

1570698935 Multi-View Human Action Recognition System Based on OpenPose and KNN Classifier

Najeeb Ur Rehman Malik; Syed A.R. Abu Bakar; Usman Ullah Sheikh

Human action recognition is one of the trending research topics in the field of computer vision. Human-computer interaction and video monitoring are broad applications that aid in the understanding of human action in a video. The problem with action recognition algorithms such as 3D CNN, Two-stream network, and CNN-LSTM is that they have highly complex models including a lot of parameters resulting in difficulty while training them. Such models require high configuration machines for real-time human action recognition. Therefore, present research proposes the use of 2D skeleton features along with a KNN classifier based HAR system to overcome the aforementioned problems of complexity and response time.

1570698950 Malaysian Sign Language Translator for Mobile Application

Soong Ke; Abd Kadir Mahamad; Sharifah Saon; Umi Fadlilah; Bana Handaga

The society often faces a communication barrier with the deaf and mute community due to the lack of sign language translators. Hand gestures are used as a sign language to communicate between the ordinary people and the deaf people. However, the existing way to learn sign language is ineffective and inconvenient. The number of mobile translator applications for the Malaysian Sign Language on the market is less. The proposed system contains a sign detector mechanism using Support Vector Machine (SVM) to detect and interpret Malaysian Sign Language. The software used in this project were IntelliJ IDEA and Android Studio. This project's development consists of four main phases: dataset acquisition, dataset trainer, shape classification, and sign recognition. The application is performed using an Android smartphone. This application allows people to easily communicate with the deaf community because it is user-friendly and does not require an internet connection.

1570698964 Convolutional Neural Network Architecture for Detecting Facemask and Social Distancing: A Preventive Measure for COVID19

Usman Sheikh; Syed Abdul Rahman; Najeeb Ur Rehman Malik; Awais Gul Airij Gul

COVID-19 is a life-threatening virus which affected people at a global level in just a matter of few months and is highly contagious. In order to reduce its spread, SOPs must be followed, such as washing hands, wearing face masks, and maintaining social distance. Hence, to aid the strict follow up of SOPs, this paper proposes a system to detect whether the people are wearing face masks and maintaining social distance or not in order to break the chain of COVID 19. The proposed system uses Deep Learning (DL) model based on Convolutional Neural Network (CNN) architecture for training the facemask detector and OpenPose 2D skeleton extraction technique for detecting social distance. A DL model based on a 7-layered CNN architecture was proposed in this research to detect masked and unmasked faces. Based on the pro-posed technique, 99.98% validation and 99.98% testing accuracies were achieved. In addition to that, the maintenance of social distance which is the new normal nowadays was also detected using the images obtained from the internet as currently, there is no such database available for detecting social distancing.

1570699623 Automatic Detection of Hotspots on Electric Motors Using Thermal Imaging

Yong Fong Lim; Soo Siang Teoh

Electrical machines are susceptible to failure at any point of time. Therefore, it is important to detect fault at early stages so that the source of problem can be identified and fixed before the condition worsens. Different methods for fault diagnosis can be used to assess the condition of an electrical machine, including: analyzing electrical parameter, vibration, and mechanical properties. In this paper, emphasis is placed on diagnosing electrical machines using thermography. Abnormal conditions in general lead to unwanted hotspot in the windings, wirings, or the casing of the machine. Thus, by identifying any hotspot appearing on any parts of the machine in the thermal images, the responsible technician can be alerted to a potential failure and pre-emptive measures can be taken. To identify the hotspot in an automated fashion, image processing technique can be used to analyze and segment the hot regions in the thermal images. In this paper, two image segmentation methods were investigated for detecting hotspots on electric motors. The segmentation methods are Otsu thresholding and k-means clustering. Dice and Jaccard indices were used as metrics to compare the performance of these two algorithms. From the evaluation, it was found that Otsu's method can provide better segmentation results compared to k-means for detecting hotspots in thermal images.

1570694013 Correlation Between Multiple Sclerosis Lesion Areas in Brain Magnetic Resonance Imaging and Patient's Disability

Ali M. Muslim; Syamsiah Mashohor; Rozi Mahmud; Gheyath Al Gawwam; Marsyita Hanafi

Magnetic Resonance Imaging (MRI) plays a very important rule to evaluate Multiple Sclerosis (MS) disease at drug treatment, treatment phase and patient's follow-up. Identification and characterization of MRI features that are related to MS patient's disability could be beneficial for efficient treatments, better patient follow-up and avoiding long procedures of physical examination to score MS patient's disability using Expanded Disability Status Scale (EDSS). This study aims to investigate the correlation between segmented MS-lesion areas in brain MRI and patient's disability score. Features from manually MS-lesion segmentation done by expert and features from automated MS-lesion segmentation were investigated. The automated segmentation produced a Dices Similarity Coefficient (DSC) of 0.5 and high false-positive rate, which indicates the seen and unseen lesions are exist. From the observation, features from automated MS-lesion segmentation have been successfully classified MS patients into two groups at 3.5 EDSS with 100% accuracy using threshold-based classifiers while features from manual lesion segmentation were failed to split MS patients into any group. In conclusion, segmented MS-lesion areas that were obtained by an automated method that only produced DSC of 0.5 with seen lesion correlate with MS patient's disability, while seen lesion area segmented by manual was not correlated..

1570696199 A Densely Interconnected Convolutional Neural Network-Based Approach to Identify COVID-19 from Chest X-Ray Images

Nazia Alfaz; Talha Bin Sarwar; Argho Das; Noorhuzaimi@Karimah Mohd Noor

The novel Corona Virus (COVID-19) has expanded so rapidly that cause a devastating effect on public well-being and create an emergency around the world. Hence, the rapid identification of COVID-19 has become a challenging work within a short period. Clinical trials of patients with COVID-19 have shown that most of the patients affected by COVID-19 experience lung infection that can cause inflammation in the lung after virus-contiguity. It can damage the cells and tissue that is inside the lung. However, pneumonia is also a lung infection that can cause inflammation in the air sacs inside the lung. Chest x-rays and CT scans perform an essential role in the detection of lung-related illnesses. Therefore, concerning the diagnosis of COVID-19, radiography and chest CT are considered as fundamental imaging approaches. This study presents a densely interconnected convolutional neural network-based approach to identify COVID-19, pneumonia and normal patients from chest x-ray images. To experiment with the proposed methodology, a new dataset is generated by combining two different datasets from Kaggle named COVID-19 Radiography Database and Chest X-ray (COVID-19 & Pneumonia). The dataset comprises of 500 x-ray images of COVID-19 affected people, 2600 x-ray images of normal people, and 3418 x-ray images of pneumonia affected people. The proposed densely interconnected convolutional neural network model produces 99% testing accuracy for COVID-19, 98% testing accuracy for pneumonia and 98% testing accuracy for normal people without the application of any augmentation techniques.

1570698325 UAV Based Mapping for Uniciti Alam Campus

Wan Azani Mustafa; Mohd Saifizi Saidon

The UAV mapping has a huge potential for a number of sectors in-cluding construction, agriculture, mining, infrastructure inspection and real es-tate. The demand for high quality aerial data capture from UAVs or unmanned aerial vehicle (UAV) is growing fast and increase rapidly. In civil application, UAVs are used as an assisting tool for a large-scale aerial mapping of the building which in general it's a challenging task for surveyor to do because of the unreach-able access area, time consuming and often cost expensive due to the limited resources and equipment. In this thesis, the UAV based mapping is introduce to overcome this problem. The selected place to do the research is the building around Uniciti Alam Campus, UniMAP. A flight mission plan was developed in two flying path that is horizontal path and vertical path and uploaded in UAV. In this study, the DJI Mavic Pro drone is used to do the mapping process. Besides that, the UAV will capture and collecting visual image when flying from different flight path. Then, the image from drone were process in Agisoft Metashape soft-ware to generate 3D modelling. The research result of this project is to determine which photogrammetry technique can generate a high quality of 3D mapping with accurate and fast.

RCMA: Robotics, Control, Mechatronics and Automation

1570699820

Development of Four-Legged Klann Linkage Walking Robot

Wan Othman

In modern days, legged robots are highly researched for several reasons, such as military use and rescue purposes. This work aims to design a four-legged walking robot using the Klann linkage mechanism that can keep moving in the desired direction by using the Inertial Measurement Unit (IMU) control. The linkages' design is drawn by using the SolidWorks simulator to manage the movement of the 4-legged robot. The robot is fabricated using a 3D printer. The robot proto-type shows that the designed robot is stable enough and manages to get an average speed of 0.0549 m/s in a straight line motion.

1570699821

Steel Pipe Climbing Robot Development

Wan Othman

The usage of an autonomous robot such as pole-climbing robots is getting more and more popular. While the availability of mass-producing, market-level pole climbing robot selling as products is small, the advantage and benefits from it can never be underrated. For example, using a pole climbing robot during the repair-ing of a light pole at the roadside can be done quickly without even blocking the road. This article introduces a pole-climbing robot to climb a steel-pipe with a diameter of 3.2 cm. The robot uses a simple extending-retracting mechanism using a single servo motor at the robot body. The robot is then attached to a steel-pipe and pre-programmed to climb the steel-pipe 2 m autonomously. The robot recorded an average speed of 0.0459 m/s from five attempts of climbing the steel-pipe.

1570696302

Pattern Clustering Approach for Activity Recognition in Smart Homes

Abdul Syafiq Abdull Sukor; Ammar Zakaria; Latifah Munirah Kamarudin; Mohd Nadhir Ab Wahab

In recent years, studies in activity recognition have shown an increasing amount of attention among other researchers. Activity recognition is usually performed through two steps: activity pattern clustering and classification processes. Clustering allows similar activity patterns to be grouped together while classification provides a decision-making process to infer the right activity. Although many related works have been suggested in these areas, there is some limitation as most of them are focused only on one part of these two processes. This paper presents a work that combines pattern clustering and classification into one single framework. The former uses the Self Organizing Map (SOM) to cluster activity data into groups while the latter utilizes semantic activity modelling to infer the right type of activity. Experimental results show that the combined method provides higher recognition accuracy compared to the traditional method of machine learning. Furthermore, it is more appropriate for a dynamic environment of human living.

1570695883 Real-Time Vibration Monitoring Using MEMS Vibration Sensors

Mohamad Hazwan Mohd Ghazali; Wan Rahiman

During operation, machines or objects generate vibration and there are unwanted vibrations that will disrupt the overall system, which results in faults such as imbalance, crack, wear, and misalignment. Thus, collecting and analyzing the vibration data has become an effective method in monitoring the condition of an object. There are many instruments to acquire vibration data and techniques to analyse the collected data. In this study, two types of vibration sensors are applied to collect and visualizes the vibration data in real-time, which are SW420 vibration sensors and ADXL345 accelerometers. The sensors are mounted on the rod, which is attached to the motor to determine the effect of the mounting position on the vibration. Then, a threshold value is set to see the reliability of these vibration sensors in detecting faults. Based on the results, mounting the vibration sensor closer to the source of vibration will generate higher vibration and both sensors can successfully detect a fault, set by the threshold values.

1570699433 Design Hyperbaric Chamber Based Wave Energy Conversion System with Pelton Turbine Control Strategies

Naeemul Islam; Mohamed Fauzi Packeer Mohamed; Md. Shahid Ullah; Md. Anisuzzaman

The hyperbaric chamber based wave energy conversion system has proposed in this research. It has five parts such as Buoy, Hydraulic pump, Hydropneumatic accumulator and hyperbaric chamber, Pelton turbine and Doubly fed induction generator (DFIG). After that, we have designed a turbine speed control system. Here, two types of the controller have used like cascade controller and cascade controller with feedforward. From the cascade controller, it has noticed that the outputs of different dynamics turbine speed governor have high damping and less stability. On the contrary, in cascade controller with feedforward, it has observed that the outputs of different dynamics turbine speed governor have less damping and high stability. Moreover, this turbine speed control system has designed in MATLAB Simulink and simulation results have shown the performance of this control system.

1570699328 Altitude and Attitude Control of a Quadcopter Based on Neuro-Fuzzy Controller

Deniz Korkmaz; Hakan Acikgoz; Mehmet Ustundag

In this paper, a 6-degrees of freedom (DoF) nonlinear dynamic model of the quadcopter is derived and a robust altitude and attitude control is proposed. The motion control is performed with four neuro-fuzzy controllers that ensure rapid and robust performances for nonlinear and uncertain systems. The aim of the designed control scheme is to provide to track the desired yaw, pitch, roll, and altitude trajectories simultaneously. The simulations are realized in the MATLAB/Simulink environment. The obtained results show that the designed control scheme is robust and efficient in both altitude and attitude responses with different uncertain trajectories.

1570696695

Latest Trends Integration of Gas Leakage and Fire Detection Using IOT: A Survey

Anwar Zainuddin; Lee Chen Fei; Sehan Amandu Gamage; Puvanaah Manokaran; Shuaib Safeer; Mohamed Ibrahim; Nor Aznan Mohd Nor

It pays to know the difference between gas monitoring solely for compliance and gas monitoring for true life safety as well as operating performance when it comes to protecting the plant from hazardous gases or catching fire. Although life safety is a major benefit of gas detector and fire sensor, do not forget that gas detectors often lead to worker wellbeing, property security and activity. A mechanical malfunction of the gas containing the equipment is the most frequent source of explosions and fires associated with gas leaks. When the malfunction happens, the gas may spill, causing fires and fire that produce gases that burn. In addition to causing headaches, people might also experience irregular breathing due to a natural gas leak. In persons that are very young or elderly, this symptom may be extremely conspicuous. Oxygen can be sucked from the air by a natural gas spill, mixing it with carbon dioxide. In extreme cases, this could lead to unconsciousness. As a safety is important in the workplace, the industrial hygienist needs prompt, detailed alerts of a gas leak so that building residents can be evacuated to a safe place in time, if possible, and so that gas leaks can be easily mitigated to avoid the overtaking or loss of property.

EEI: Electrical Powers, Energy and Industrial Applications

1570698747 Performance Analysis of a Unified Power Quality Compensator to Mitigate Power Quality Problems

Mohammad Faisal Akhtar; Mohammad Nishat Akhtar; Junita Mohamad-Saleh; Wan Othman; Elmi Abu Bakar

The Unified Power Quality Compensator (UPQC) is one of the most widely studied Custom Power Devices (CPDs) as it is a single solution for mitigat-ing voltage and current-related abnormalities in a distribution grid, which may arise due to increased use of non-linear loads and integration of renew-able energy sources. In this paper, a popular control method of the UPQC - the synchronous reference frame (SRF) method - is tested in a 415 V distri-bution system, and the system performance is observed & analyzed in a MATLAB-Simulink environment, using the SimPowerSystems Toolbox. The outcome of this discussion and analysis may help provide insight into why the UPQC is a heavily researched topic in the field of power quality. An efficacy can be determined of a popular control scheme pertaining to this device by analyzing the voltage and current waveforms before and after the deployment of UPQC into the system.

1570695096 Model Predictive Control of Single-Phase Simplified Split-Source Inverter

Adrian Soon Theam Tan; Dahaman Ishak; Rosmiwati Mohd-Mokhtar; Sze Sing Lee

This paper presents model predictive control (MPC) of single-phase simplified split-source inverter (S3I). The derivation and implementation of MPC are discussed, and the performance of the control method is verified with the steady-state results from MATLAB Simulink. Results show that the S3I can deliver good performance while tracking the reference DC link voltage and reference output current closely.

1570698859 Partial Discharge Activity Under Influence of Metal Particle Number in Mineral Oil and PFAE

Kiasatina Azmi; Dahaman Ishak; Nor Asiah Muhamad; Ahmad Zuhairi Abdullah; Umar Khayam; Mohamad Kamarol Mohd Jamil

Partial discharge (PD) under influence of spherical metal particle number in conventional mineral oil and Palm Fatty Acid Ester (PFAE) has been measured in order to understand the PD activity in transformer oil. PD under influence of single spherical metal particle has been compared with three metal particles number for both transformer oils under quasi-uniform field at three consecutive gaps of 5mm, 7mm and 9mm at electric field strength of 2kV/mm. Partial discharge inception voltage (PDIV) of single metal particle has very similar value with three metal particles number either in mineral oil or PFAE for all gap distances. In addition, phase-resolved partial discharge (PRPD) of mineral oil and PFAE due to single and three metal particles number revealed to have a distinguishing characteristic.

1570696331

A Maximum Power Point Tracking Using Levy Particle Swarm

Charin Chanuri; Dahaman Ishak; Muhammad Ammirrul Atiqi Mohd Zainuri

A Levy Particle Swarm for maximum power point tracking in photovoltaic (PV) system is presented in this paper. Levy flight is integrated with particle swarm optimization (PSO) for full exploration of the power-voltage (P-V) curve. The randomization step size of Levy flight has a high influence on convergence speed and harvesting optimum power point. The proposed technique is verified with simulation and experiment studies. Both simulation and experiment results proved that the proposed algorithm successfully tracks global maximum power point (GMPP) and local maximum power point (LMPP). The proposed algorithm is efficient in tracking optimum points under uniform and non-uniform irradiance with almost zero steady-state oscillation.

1570696893

Analytical Subdomain Model for Double-Stator Permanent Magnet Synchronous Machine

Mohd Saufi Ahmad; Dahaman Ishak; Mohd Rezal; Tow Leong Tiang; Mohamad Kamarol Mohd Jamil

This paper presents an analytical subdomain model for predicting the magnetic field distributions in three-phase double-stator permanent magnet synchronous machine (DS-PMSM) during open-circuit and on-load conditions. The model is initially derived based on Laplace's and Poisson's equations in polar coordinates by separation of variables technique in four subdomains, i.e., outer airgap, outer magnet, inner magnet and inner airgap. The field solutions in each subdomain are obtained by applying the appropriate boundary conditions and interface conditions. Finite element analysis (FEA) is later deployed to validate the analytical results in DS-PMSM having different number of slots between outer and inner stators with a non-overlapping winding arrangement. The analyzed electromagnetic performances are slotless airgap flux density waveform, back-emf waveform and output torque waveform. The results show that the proposed analytical model can accurately predict the magnetic field distributions in DS-PMSM.

1570698681

An Improved Non-Dominated Sorting Genetic Algorithm III with Grey Relational Analysis Decision Making for DG Placement and Sizing

Norainon Mohamed; Dahaman Ishak

In this paper, an improved Non-dominated Sorting Genetic Algorithm III (NSGA III) is proposed in determining the location and sizing of multi-DGs. NSGA III is the new variant of pareto-based evolutionary algorithm by using reference point approach. Grey Relational Analysis (GRA) is used to determine the best compromise among the non-dominated pareto solutions. Considering that minimization of power losses and improvement of voltage profile as the objectives, the proposed method is applied to IEEE 14 bus system. The obtained results are comprehensively compared with other published works. From this comparative analysis, it is proved that the proposed algorithm is very effective in reducing the line losses and improving the voltage profile.

1570698692 Electrical Treeing Characteristics of XLPE Material Containing Alumina Nano-Filler

Noor Syazwani Mansor; Nazatul Shiema Moh Nazar; Nur Zatil 'Ismah Hashim; Dahaman Ishak; Mariatti Jaafar Mustapha; Mohamad Kamarol Mohd Jamil; Huzainie Shafi Abd Halim; Ahmad Basri Abd Ghani

The investigation on the electrical trees characteristics in unfilled cross-linked polyethyline (XLPE) and XLPE containing Aluminium oxide (Al2O3) nanofillers has been carried out. The characteristics of electrical trees in XLPE/Al2O3 nanocomposites were compared with the unfilled one. Variation on the concentration of Al2O3 nanofiller in XLPE was carried out from 0.5wt% to 1.5wt%. The result reveals that the Al2O3 nanofillers in XLPE composite did improve the compare with the unfilled one. However, the addition of 0.5 wt% up to 1.5 wt% of Al2O3 nanofiller have improved electrical tree growth, respectively in comparison to the unfilled one .

1570697013 PQ Control Strategy in Single-Phase Inverter for Grid-Connected Photovoltaic Energy System Under Linear and Nonlinear Loads

Nur Fairuz Mohamed Yusof; Dahaman Ishak; Mohamad Kamarol Mohd Jamil

In photovoltaic (PV) applications, single-phase inverters are commonly used for DC to AC power conversion interfaces. The most critical factor in evaluating the performance and quality of the inverter is to examine the output voltage and current. These outputs should be sinusoidal with low total harmonic distortion (THD) even when connected either to linear or nonlinear loads. This paper presents an improved inverter control strategy that is modelled in a PQ reference frame. The Hysteresis Current Control (HCC) is used to provide the switching signals for the inverter power switches. The PQ approach is also employed to control the power flow between the DC bus-inverter-grid. Based on the simulation results obtained, the proposed control strategy is capable of achieving robust current regulation, unity power factor, low THD and maximizing energy extraction from the PV arrays for supplying electricity to the power grid.

EDA: Electronic Design and Application

1570696126 Fabrication of High Performance High Electron Mobility Transistor Design Based on III-V Compound Semiconductor

Hla Myo Tun

The constraint for high power and high frequency involves semiconductor materials with a wide bandgap, which has many higher breakdown voltages because the crucial breakdown field is obligatory for band-to-band impact ionization. Among wide-bandgap semiconductors, III-V compound-based materials are disputably the most matured ones in terms of wafer-size availability, technology, and market prospects. III-V compound-based Transistors are emerging as promising candidates for high-temperature reliability, high-power electronics, and radio-frequency (RF) electronics due to their unique capabilities of observing higher current density, higher breakdown voltage, higher operating temperatures, and higher cut-off frequencies compared to conventional semiconductor materials such as silicon (Si). However, III-V compound-based semiconductor suffers from high ohmic contact resistance, high leakage current, and high surface sensitivity. This paper is mainly focused on developing low contact resistance using Ti/Al/Ni/Au metal stack on AlGaN/GaN-based devices for high operating frequency applications such as 5G and beyond.

1570697318 Novel FPGA-Optimized Stochastic Number Generator for Stochastic Computing

Yang Yang Lee; Zaini Abdul Halim; Mohd Nadhir Ab Wahab

Stochastic computing (SC) is a computing domain that exploits probability to perform arithmetic operations with a single logic gate. It was introduced in the 1960s, although disfavoured in the semiconductor industry, the recent IoT trends and edge computing bring up the SC technology due to its power efficiency and error resilience properties. Most of the SC studies are biased to the application-specific integrated circuit (ASIC). In contrast, the field-programmable gate array (FPGA) might not be able to translate the highly customizable ASIC logic into the FPGA fabric efficiently, causing underutilization of FPGA resources. Multiplexer (MUX) could generate stochastic stream directly from binary input with a specialized finite state machine (FSM). However, the FSM is very limited on state tracking when the binary resolution expands, bottlenecking the scalability of the MUX-based stochastic number generator (SNG). This paper proposes a new function block to port the traditional random number generator to MUX, eliminating FSM bottlenecking and allows MUX SNG resolution scales to 8-bit and beyond. The result shows up to 50% reduction in FPGA resource utilization and 62.5% reduction in bus width for parallel SNG implementation compared to the ASIC logic transcoding.

1570698312 Effect of Gate Dielectric Thickness on the Performance of Top-Down ZnO Nanowire Field-Effect Transistors

Nor Azlin Ghazali; Mohamed Fauzi Packeer Mohamed; Muhammad Firdaus Akbar; Harold Chong

This paper report the fabrication and characterization of top-down ZnO nanowire field-effect transistors (FETs) using SiO2 gate dielectric in an attempt to compare the effect of gate dielectric thickness on performance of the fabricated device. ZnO nanowire FETs with four different gate dielectric thickness ranging from 25 nm to 100 nm were fabricated in this experiment. ZnO nanowire were fabricated at room temperature by remote plasma atomic layer deposition (ALD) method. The FETs with 100 nm thick gate dielectric layer exhibited superior electrical performance as compared to the other devices. The study reveled that the SiO2 layer cannot be too thin in order to maintain its insulting ability to act as the gate dielectric layer in ZnO nanowire FETs.

1570699367 A 5 GHZ Current Controlled Oscillator with Active Inductor

Norlaili Mohd Noh; Jagadheswaran Rajendran; Harikrishnan Ramiah; Chakaravarty Rajagopal

Oscillators play the key role in determining the quality of the RF communications system. Most oscillators are voltage based (VCO) and comes mainly in two types, which are the LC tank oscillators and the non LC-tank oscillators. The former is very good for lower phase noise due the usage of passive inductor. The latter, such as ring oscillators, are much smaller in size, thus lower cost, but exhibit much higher phase noise. However, current sources are becoming more popular and employed in oscillator to form Current Controlled Oscillator (CCO) due to its higher frequency as compared to voltage source. Hence, the goal has been put forth to design a CCO that produces 5 GHz center frequency, tuning range of 500 MHz and with phase noise better than -110 dBc/Hz by employing active inductor. To demonstrate the proposed concept, 5-stage ring oscillator with active inductor controlled by a current-mode circuit, was designed and ran through simulation using 0.18um CMOS technology. Various simulation results show that the frequency range of this 5-stage oscillator runs between 3.87 GHz to 5.81 GHz. The critical parameter of any oscillator, which is the phase noise, is -113.2 dBc/Hz at 1 MHz offset with a center frequency of 5.81 GHz. The performance of this new design has improved, in general, about 50% on the frequency while 15% on the phase noise as compared with the non-LC Tank topology.

1570693822 Speeding Parasitic-Extraction Stage in Layout-Change-Order Validation Cycle Through Net-Tracing and Layout Trimming

Lucan Tien Boon Tan; Nor Muzlifah Mahyuddin

A real layout design cutting solution to speed up the post-layout extraction run time is presented. It reduced the extraction run time down to less than 10 minutes for a huge design block with Electrical Changes Order (ECO) consist of small layout area changes and able to maintain the accuracy within 5%. The solution can be applied to improve the In-Die-Variation (IDV), System-On-chip (SoC) level Electrical Static Discharge (ESD) structure verification and 3D-IC interface verification without accuracy loss with speed up time by more than 10x.

1570694857 A 10-Bit Partial Binary Tree Network DAC Utilizing Op-Amp as an Output Current Magnifier

Mohd Tafir Mustaffa; Zi Jun Tan

Digital-to-Analog Converter (DAC) is an important element in many digital systems that demand high-performance data conversions. Due to factors like shrinking supply voltage and budget constraints, DAC highly relied on matched components to perform data conversion. In reality, matched components are nearly impossible to fabricate, because mismatch errors always occurred between designed and actual component value. Therefore, in this work, the Dynamic Element Matching (DEM) algorithm is used, known as Partial Binary Tree Network (PBTN). PBTN reduces the complexity of the circuit and produces an output signal with fewer glitches. In this work, the op-amp built by transistors is used as an output current magnifier. Results show the simulation of 10-bit 1-MSB PBTN DAC using a non-ideal op-amp produced a DNL of -0.182979 LSB, INL of -0.959287 LSB, and power consumption of 1.108 mW.

1570695136 Solar Powered Automatic Dissolved Oxygen Optimiser for Tumpat Caged Fish Farm Kelantan

Mohd Sani Said; Azhar Abdullah; Muhammad Sufyan Safwan Mohamad Basir

In caged fish farm, maintaining the water quality is crucial since water contamina-tion may introduce toxin and oxygen deficiency. One of the best solutions is to optimize the dissolved oxygen (DO) value to the necessity of the fish, by means the DO should be higher than 3 mg/L. This research proposed a solar powered fish DO Optimiser to monitor the DO level in Tumpat caged fish farm, Kelantan. The proposed system is supplied by using an off grid solar system, hence made this system can be stationed far into the lagoon. The DO value is measured by us-ing EZO-DO sensor which dipped into the fish cage water. If DO concentration is below 3 mg/L, the DO water stored will be pumped into the cage water to rise the DO value. Besides, the subsequent low DO concentration after the DO water infiltration will trigger the paddle wheels to spin until the DO reaches normal lev-els. From the outcome obtained, the proposed system able to maintain the DO at 5.63 mg/L averagely. The advantages in low production and maintenance costs in enhancing the proposed DO Optimiser may potentially multiply caged fish farm-ers' income in accordance with capability to reduce the dead fish up to 40% under 7600 population.

1570695428

Optimizing RAM Testing Method for Test Time Saving Using Automatic Test Equipment

Aeizaal Azman Abdul Wahab

Due to the memory size increase drastically in the field programable gate array (FPGA) or system on chip (SOC) device, it become hard to meet the tests cost budget of the product especially for low-cost device. One of the major factors of test cost contributed is the test time. For the low-cost product, the tolerance number of the defects per million (DPM) are relative high compare to high cost product. By taking this advantage, an optimizing memory testing method able to implement to minimize the test time without jeopardize the test cov-erage. A memory Build-in Self-test (BIST) design with capability of algorithm failing se-quence capture have been developed to implement in the Automate Test Equipment (ATE) flow for production screen. 3 selected algorithms have been tested on the 8 detect units in ATE flow to prove the concept of this method. The failing algorithm sequence of the units have been logged into database and analyzed for algorithm trimming. With the proper ex-amples, the algorithm trimming location and test time saving calculation have been shown in this research. For this example, approximate 33% of test time reduction observed for 1Kbyte memory testing with Hammer Head algorithm. In summary, this research has pro-posed the memory test time saving by optimizing the tests algorithm on the ATE flow.

TSA: Telecommunication System and Applications

1570694422 Bowtie Antenna Design with Lumped Element Modification for Partial Discharge Measurement Applications

Asep Wahyu Shopiyudin; Umar Khayam; Yuda Hamdani; Mindit Eriyadi

In this study, a bowtie antenna design was developed with the addition of lumped elements, namely resistors and capacitors. This modification technique can increase the working frequency of the bowtie antenna. The initial design used was 30 mm for wing radius, 90° for flare angel, 2 mm for gap distance, 1.6 mm for substrate thickness. Form the simulation results, it was found that there was a significant increase in the resistance value of 33 ohms with a gain of 111% from the previous results. Whereas for the capacitor at a value of 0.01 pF it reached but the result was that the working frequency decreased by 38% from the previous result. The maximum bandwidth obtained is 0.9195 GH, for low frequencies at 1.2641 GHz, for high frequencies at 2.1836 GHz, for resonating frequencies at 1.7442 GHz and for minimum return losses at -21.423 dB. The resulting radiation pattern has two directions, right and left (bidirectional) with a directivity of 89°, and the highest gain is at a frequency of 1.5 GHz. From these results we can conclude that the bowtie antenna can be used for partial discharge measurement applications.

1570695786 1.8 V, 8-Bit Integrated ADC and DAC in CMOS 180 nm for Bluetooth Low-Energy (BLE) System

Norhamizah Idros; Alia Rosli; Zulfiqar Abdul Aziz; Jagadheswaran Rajendran; Arjuna Marzuki

This paper demonstrates the design of integrated 8-bit pipelined ADC and DAC for Bluetooth Low Energy (BLE) system. The op-amp has provided sufficient open-loop DC gain to guarantee the excellent performance of ADC. While the hybrid DAC, which has been partitioned equally into two sub-segments, i.e. cur-rent-steering and binary-weighted resistor architectures operated with low power consumption and maintained good performance. This design has been performed using Silterra 180 nm CMOS process technology with the supplied voltage of 1.8 V. The silicon area is 3.02 mm 2 . Post-layout simulation results exhibited the integrated ADC and DAC consumed 39.6 mW for data conversion.

1570695879 High Efficiency CMOS Power Amplifier with Integrated Driver Based APD Linearizer

Premmilaah Gunasegaran; Jagadheswaran Rajendran; Selvakumar Mariappan; Zulfiqar Abdul Aziz; Yusman Mohd. Yusof

This paper presents a high efficiency CMOS Power Amplifier (PA) integrated driver based analog pre-distortion (APD) Linearizer. The APD linearization technique has been used as a resolution to enhance the linearity without degrading the efficiency. A 2.45 GHz PA prototype is developed in 180 nm technology. It achieves an input and output return loss of less than -10 dB and power gain more than 20 dB over the operating bandwidth of 2.4 to 2.5 GHz while preserving an unconditional stability performance up to-10 GHz. With maximum output power of 26.7 dBm, the PA delivers 3 rd order intercept point (OIP3) of more than 30 dBm with peak power added efficiency (PAE) of 47.2 %. The power consumption of 900 mW is achieved with supply voltage of 3.3 V at maximum output power. The fully integrated circuit consumes 2.72 mm 2 of area.

1570698004 An On-Chip Integrated CMOS Ring Mixer-Balun-VCO Achieving IIP3 of 11.2 dBm and Phase Noise of -117.2 dBc/Hz

Pravinah Shasidharan; Jagadheswaran Rajendran; Selvakumar Mariappan; Yusman Mohd. Yusof

This paper presents an integrated up-conversion passive mixer fitted with an on chip active RF Balun merged with Class-C VCO. This combo architecture limit the use of off chip passive balun for combining the differential signal input to single-ended signal output implemented in RF Transmitter system. The proposed architecture adopts a symmetric passive ring mixer for high linearity, port to port isolation and stable matching. The mixer achieves highest power conversion gain of 36 dB across the VCO input power, high input 3 rd order intercept point (IIP3) of 11.2 dBm and gain of 8 dB at 2.45 GHz. The integrated VCO results in phase noise of -117.2 dBc/Hz at 1 MHz offset with large signal output power of 5.2 dBm. The entire architecture occupies chip area of 1.21 mm 2 designed in 180 nm technology, consuming 5 mW of dc power consumption under supply voltage of 1 V.

1570698945

A Review of Process for Wearable Communication Antenna

Ahmad Rifhan

Wearable fabrics are the dominant, overwhelmed research topics for body-centered communication especially in Industrial Revolution 4.0 (IR4.0) and Internet of Things (IOT) applications, as versatile body signal receiver antennas. To build a wearable antenna, there are many planning processes beforehand. Wearable antennas need to be conformal when used on different parts of the human body, so they need to be incorporated with a low-profile structure using lightweight designs. In addition, these antennas need to be capable of functioning near the human body with minimal degradation. In the design of wearable antennas and fabrication methods, this analysis aims to present various preparation method of fabrication techniques. As wearable antennas are promising, this study is important for the revolution in advanced communication and IR4.0 and suggested a great future alongside the growth of the rapidly growing wireless communication technology

1570698981

Wireless Sensor Network's Agricultural Monitoring System Using TDMA Based Wireless Communication

Ching Ping Wong; Mohd Fadzli Mohd Salleh

Due to the growing need for a higher volume of food production by the world's population, today's agriculture needs to become "smart" coping with this demand. Wireless Sensor Network (WSN) is no longer an idea that to be the next big thing, but the "thing" that already applied in agriculture, especially in hydroponics, aeroponics, aquaponics, etc. This work presents a wireless sensor network hydroponic system that utilizes the state-of-the-art of the IoT-based technique. This system can monitor real-time hydroponic plant parameters and analyze the parameters online via PC or smartphone. A prototype of a small network of hydroponic systems that consists of several sensor nodes will be developed. This prototype will be structured with the concept of a wireless sensor network which consists of a gateway node (controller) that connects to sensor nodes and communicates to the cloud. The sensor nodes will transmit the collected data from the sensors to the gateway node (controller) which is the receiver and store the data in the cloud by using the TDMA (Time Division Multiple Access) channels accessing method. The sensors used are pH, light intensity, water level temperature, and humidity sensors. Investigation of the changes in collecting data from sensors will be carried out to monitor the hydroponic plants in advance. Thus, this project is able to replace the manual monitoring system, and help farmers monitoring the significant environmental factors in advance even when the farmers were to be outstation.

TECHNICAL SESSION 4

VIS: VISION, IMAGE AND SIGNAL PROCESSING

1570696538 Development of Morphological Image Processing Learning Module for Mobile Application

Suhaila Sari; Nabilah Ibrahim; Hazli Roslan; Nik Shahidah Afifi Md. Taujuddin

This paper focuses in the development of a Morphological Image Processing learning module for mobile application. This Morphological Image Processing module consists of erosion, dilation, opening and closing sub-modules. The Graphical User Interface (GUI) is developed by using the Android Studio software. The application is provided with various test image datasets, together with brief explanations for each image processing function to improve the learning efficiency of the users. The performance analysis is evaluated through data collection from survey conducted among university students attending formal Image Processing course. The surveys involve the market test and performance review surveys. It can be concluded that the understanding level among students increased 67.77%. Furthermore, the number of students who did not understand has been decreased 100%. Therefore, 100% of respondents with formal Image Processing knowledge agreed that their understanding increased with the assistance of this application in their conventional Image Processing learning.

1570698527 A Deep Learning Approach for Detecting Medical Face Mask on Human Faces in Response to Covid19

Mahmud Hasan

In this difficult time of COVID19, using a facial mask is a lifesaver, specially in all indoor public places. In this work, a deep learning based approach is proposed that detects whether or not a human face contains a face mask. The proposed method is capable of detecting the facial mask with 98% accuracy for any frontal face static image or videos. The validation was performed on a variety of different scenarios to ensure the accuracy.

1570698714 Segmentation of Diabetic Retinopathy Using Entropy-Based Thresholding - A Review

Mohammed Saleh Ahmed Qaid; Shafriza Nisha Basah; Haniza Yazid; Fathinul Syahir Ahmad Saad

Diabetic retinopathy (DR) is the major complication of diabetic patients. The detection of blood vessels in the retina is supportive for ophthalmologists, where detection of blood vessels and abnormalities is very difficult due to the presence of bright and dark tissues in the retinal images [1]. This paper reviews Entropy-based Thresholding (ET) for DR abnormalities segmentation, since ET has been shown to have superior performances compared to the other methods. The focus of the review are theoretical and implementation aspects of local entropy and maximum entropy algorithms in the segmentation of DR. In terms of performances, local entropy algorithm is able to detect the blood vessels and estimate the correct threshold value. While maximum entropy is effective for the segmentation of exudates and provide a good separation between retinal and its back-ground. However maximum entropy algorithm is unable to segment small diameter blood vessels and sensitive to noise, which make both entropy algorithms are important since both have their own advantages and limitations. Furthermore, local entropy effective in segmentation of blood vessels and maximum entropy perform well in exudates segmentation.

1570692359 Enhanced the Face Recognition Accuracy by Using Histogram of Oriented Gradients (HOG) in Pre-Processing Approach

Wei Seng Yeap; Mohd Nadhir Ab Wahab; Chia Chuan Wu; Kevin Yeap Khai Wen; Tung Lun Loo

Face recognition has received significant attention because of its numerous applications in access control, security, and surveillance system. In real-world scenarios, uncontrollable lighting conditions, a variety of posture and facial expressions, and noisy facial images can degrade the face recognition accuracy. Hence, the research based on the HOG algorithm and pre-processing implementation framework processing framework to improve face recognition accuracy is proposed. This proposal consists of four stages where the first stage is to build a dataset of 15 subjects and has five series of multi-poses of facial images. The second stage is focused on enhancing the pre-processing framework that consists of denoising colored, illumination normalization, and facial alignment algorithms. For the third stage, the HOG algorithm is utilized as a feature descriptor to detect the face. The fourth stage is implementing the deep convolution neural network to evaluate the accuracy of face recognition. From the observation, the improvement in the accuracy rate is up by 4.37% after the enhancement of the pre-processing framework.

1570698957 YOLO Based Deep Learning Network for Metal Surface Inspection System

Shwe Lamin Aein

Surface defects on metal are complex and it becomes one of the most common problems in the industrial environment. Different production lines can cause surface defects with various properties. Defect detection of the metal surface is necessary for the quality control of industrial products. Traditional programming approach, machine learning, or deep learning are applied for vision-based metal surface defect inspection system. Among them, deep learning becomes popular to improve the quality control in industrial applications. In this paper, You Only Look Once (YOLO) object detection network is used for the development of metal surface defect inspection system. The purpose of this paper is to present the metal surface inspection system that can differentiate the types of defects and locate the defect. YOLO deep learning network for metal surface inspection system is implemented on the Jetson Nano embedded board. The Northeastern University (NEU) surface defect dataset is used. YOLO network can predict six types of defect on the metal surface and performance of 71% mAP is achieved. The total processing time for each defect image is 0.034 seconds.

1570696311 Survey on Loss Functions for Face Recognition

Seng Chun Hoo; Sirajdin Olagoke Adeshina; Haidi Ibrahim

Significant progress in the development of new loss functions has led to the improvement in the discriminative power of learned face features. Generally, loss function is used to find the difference between the correct output and the predict-ed output of face features from a convolutional neural network model. Greater differences between the two outputs lead to higher loss function which indicates poor performance. On the other hand, for two outputs that are identical or near similarity, the loss function is zero or low respectively implying better performance. In other words, the model is trained iteratively until the loss function or error is minimized. As a result, loss function encourages the minimization of intra-class variations and the maximization of inter-class differences. Note that the loss function is only implemented during the training phase and is discarded in the testing phase. In this paper, different types of loss functions for face recognition are reviewed. These loss functions are categorized into four groups, namely Metric Learning, Classification Loss, Mining-based Loss and Balancing-based Loss.

1570696411 Impact of Similarity Measure Functions on the Performance of Coherent Filtering Detection

Sami Abdulla Mohsen Saleh; Shahrel Azmin Suandi; Haidi Ibrahim

Coherent motions depict the collective movements of individuals in crowd, which widely exist in physical and biological systems. In recent years, similarity-based clustering algorithms especially Coherent Filtering (CF) clustering approach has gained high popularity in the field of coherent motions detection. CF finds motion clusters of different scale, density, and shape, in the presence of large amount of noise and outliers. The similarity measure function is utilized as the initial base step for determining the relationships among crowd individuals and thus detecting coherent motion from noisy time series data. In this paper, we evaluated the impact of four different similarity measure functions upon CF clustering approach, namely, Chebyshev, Euclidean, Canberra and Cosine, and the results were compared subsequently. Evaluation and comparison are conducted on synthetic data in two dimensional space. Results reveal that the Euclidean similarity function emerges as the best measure for capturing coherent motions from crowd clutters, while Cosine similarity function performs the worst.

1570696297 Convolutional Neural Network with Hidden Markov Model to Identify Non-Severe Traumatic Brain Injury from Electroencephalography

Chi Qin Lai; Azlinda Azman; Jafri Abdullah; Haidi Ibrahim

Traumatic brain injury (TBI) is one of the traumas that requires instant identification and medical treatment. Fail to do so will result in fatality. The computed tomography (CT) or magnetic resonance imaging (MRI) are conventionally used to diagnose TBI, despite there were limited resources in the hospitals. As a substitution for early screening of TBI, EEG is a potential tools as it is easily available and portable. However, EEG analysis have to be done manually by doctors or experts, which is time consuming. This study proposed an automated approach based on EEG and deep learning to classify non-severe TBI patient. Convolutional neural network (CNN) is used to perform feature extraction from the resting state EEG and used to train hidden markov models (HMM). The proposed architecture is able to achieve classification accuracy of 85.5%.

RCMA: Robotics, Control, Mechatronics and Automation

1570692492 A Fast and Flexible Turret Based Automated Vision Inspection (AVI) to Inspect 6 Sides of Small Discrete Components

Loo Kean Li; Saw Chong Keat; Mohd Haniff Ibrahim

Smart devices components come in a variety of shapes, sizes and texture. To perform a high throughput inspection on all the six sides of the surface of the component is challenging due to tolerances of product dimension and the multiple planes on its surface. The image acquisition system for surface inspection comprises of a CMOS camera, telecentric lens, LED light source and motorized actuator. HALCON vision library was used for image processing. One of the most important requirements of an effective Automated Vision Inspection (AVI) is consistent part presentation. Thus, to perform the positioning correction we propose two position recognition method using 2D-metrology and Smallest Rectangle Segmentation. The result of the position recognition was fed to XY rotary table for offset correction before picked up by turret fingers. Actuators for camera focusing were added to increase the flexibility of the system to inspect various component sizes. The Exposure End event of a modern CMOS camera was used for parallelization to optimize the machine vision cycle time.

1570693919 Autonomous Grass Lawn Weeding Mobile Robot Based on Image Processing Using LabVIEW

Vicky Wei Hau Kong; Abdul Sattar Din

Weeds are unwanted wild plants that grow among crops to compete with them for nutrients, sunlight, water etc. In addition to crops, weeds are a major problem in grass lawns and fields. Traditional weeding method uses herbicides, which can cause soil pollution and endanger the neighbouring grasses. To tackle these challenges, an autonomous weeding mobile robot was designed to pull the weeds out of a lawn. The weeding robot consists of a vision system and 3D printed gripper mechanism mounted on an autonomous mobile platform. The image processing algorithm of the vision system for weeds identification in a lawn was designed using LabVIEW to identify weeds from lawn grass. The performance analysis of the weeding robot was carried out on the artificial lawn by allowing the robot to move in a straight path and remove the weeds along the way. The result showed an average success rate of 90%.

1570695788 A Review of Recent Mobile Robot Application Using V-SLAM in GNSS-Denied Environment

Izzati Saleh; Wan Rahiman

This paper reviews the recent mobile robot application of Visual Simultaneous Localization and Mapping (V-SLAM) in GNSS-denied environments. V-SLAM is a heavily researched topic over the past two decades, and many of its algorithms have been adapted and applied on mobile robotics platforms. In a situation where GNSS signals are weak, the V-SLAM technique allows mobile robots to localize its' position and resume navigation. This paper highlights the common usage of visual sensors in V-SLAM techniques and its corresponding mobile robot applications.

1570696525 CNN-Based Off-Board Computation for Real-Time Object Detection and Tracking Using A Drone

Sophan Wahyudi Nawawi; Ahmed Asraf Mohamed Ahmed Abdou

Object detection and tracking has become one of the most important applications for UAVs, especially in surveillance applications. Single object tracking using a drone is an active field for research due to its importance in surveillance. In this paper, a real-time human and cars detection and tracking approach is proposed using a CNN-based technique by combining the state-of-the-art object detection algorithm YOLOv4 with the state-of-the-art multi objects tracking algorithm DeepSORT using video streaming from a drone for the purpose of surveillance. Furthermore, an algorithm was developed to enhance the observation ability by choosing a single object to be tracked. The algorithm was implemented using Tello drone with a developed navigation algorithm based on the vision analysis.

1570696610 Point Cloud Generation with Low-Cost Camera for Visual SLAM

Chun Wei Chuah; Ban Hoe Kwan; Danny Wee Kiat Ng

This project was carried out to implement low-cost cameras in visual simultaneous localization and mapping (SLAM) for unmanned surface vessel (USV), by generating landmarks from stereo images. A program with pre-processing steps and a stereo block matching algorithm was developed. Gaussian filter, morphological transformation and binarization were applied in the pre-processing steps to segment the coastline from the stereo images. The block matching algorithm then computed the disparity and generated point clouds from the coastline pixels. The generated point clouds were noted to properly reflect the coastlines with an overlapping between different point clouds, inferring their potential to be used as landmarks in SLAM.

1570698278 Fast Initial Response for Auxiliary Information Based EWMA Chart for the Process Mean

Ng Peh Sang; Yu Jia Lau; Huai Tein Lim; Wai Chung Yeong

Numerous studies have shown that the control charts with the fast initial response (FIR) feature result in a quicker detection of early off-target process shifts (initial out-of-control). Control charts with the FIR feature is useful for processes with an inefficient start-up setting and an ineffective control action following the occurrence of assignable cause(s). Therefore, this work integrates the FIR feature into the auxiliary information (AI) based exponentially weighted moving average (EWMA) chart with time-varying control limits (denoted as FEWMA-AI) for monitoring the process mean. A Monte Carlo simulation approach is adopted to compute the average run length (ARL) and standard deviation of the run length (SDRL) of the FEWMA-AI chart. To show the superiority of the FEWMA-AI chart in process monitoring, the proposed chart is compared with the existing EWMA-AI chart without FIR feature, where the results show that the former chart detects shifts faster than the latter chart for all sizes of process shifts, across different levels of correlation between study and auxiliary variables (ρ) under consideration.

1570699664 Design Safety Training Using Extended Reality Tracking Tools in Semiconductor Fabrication Laboratory Furnace

Ahmed Jamah Alnagrat; Rizalafande Che Ismail

Due to the possibilities provided by such technologies to provide people with live immersive virtual worlds, Extended Reality (XR) technologies such as virtual (VR), augmented (AR), and mixed reality (MR) have grown. The role of the XR has been very effective and useful in virtual laboratories (VL) as experiments can be performed almost anywhere. Students suffer from the problem of dealing with dangerous appliances in the lab such as a Semiconductor fabrication furnace, which has a high temperature. In recent years, modern sensors such as Leap Motion Controller can track human movements and analyze the accuracy. This work presents a novel approach design for training that tracks body movements and alerts notifications trainee to approaching dangerous places while working with a semiconductor manufacturing furnace in a virtual laboratory. This training enables the trainee to prevent his burning during the experiment according to safety standards and is also considered in compliance with the standards of social distancing. By using a game engine Unity 3D to measure the accuracy, quality and efficiency of the system. This training is considered very safe and conforms to safety standards to avoid injuring. Using the conclusion of this analysis can improve application development in terms of accuracy and interactivity in the field of human-computer interaction (HCI).

1570696388 Sensing and Control of Autonomous Driverless Car on Road (SCAD)

Kelvin Teoh; Wan Rahiman

Intelligent robot navigation has gained numerous attentions from the space, transportation, and industrial areas. It is a vital part in making the robot moves autonomously in various static and dynamic conditions. In robot navigation, a camera becomes the main sensor of the sensing of the environment. Any inputs that come across the camera (the eyes of the robot) will then be sent to the image processing system with an algorithm that can decide the navigation of the robot. The real-time image processing for this project is using OpenCV with C++. The controller for the navigation is using Arduino. This study is divided into two sections which are vision image processing and robot navigation control. In this paper, only the vision image processing section are discussed.

IS: Intelligence Systems

1570699002 Optimal Selection of Parallel Atrous Convolutions for MobileNet V3

Siti Raihanah Abdani; Mohd Asyraf Zulkifley; Nor Azwan Mohamed Kamari; Asraf Mohamed Moubark

An eye disease screening system is an important tool for health practitioners in performing mass screening tests at a low cost. Thus, the system is usually built for a mobile platform where the form factor is small and easily dispatched to rural areas. The system is also expected to perform automated decision-making with the help of the state-of-the-art intelligent artificial intelligence system. Hence, MobileNet V3 is an optimized convolutional neural network, which has been designed specifically for mobile applications. It consists of a stack of expansion modules that have been embedded with squeeze and excitation units. However, the network does not have dedicated multi-scale feature extraction functions to cater to objects of interest of various sizes. Therefore, a set of parallel atrous convolution with multiple dilation rates has been integrated into the original network to further improve classification accuracy. The results show that a set of atrous convolution with a maximum dilation rate of 4 produces the best accuracy of 0.719.

1570699131 Deploying Fuzzy Rough Set and Artificial Immune System Algorithms for Air Quality Prediction

Ayodele Lasisi; Rozaida Ghazali; Lokman Hakim Ismail; Noor Aida Husaini

The widespread of air pollution due to emissions of highly detrimental concentrates on human life needs paramount attention. Devising air prediction strategy that accurately analyze air quality level through gathering of useful information allow for relevant organizations to disseminate promptly control measures. This paper proposes the use of artificial immune system (AIS) algorithms consisting of Immunos algorithms (Immunos-1, Immunos-2, Immunos-99), CLONal selection ALGorithm (CLONALG), clonal selection classification algorithm (CSCA), artificial immune recognition system algorithms (AIRS1, AIRS2, Parallel AIRS2) for air quality prediction. The fuzzy rough set selects pertinent data features summarizing interpretations of the data. Comparative simulations reveal that the Parallel AIRS2 produced superlative results to other algorithms with detection rate of 96.40%. Effective prediction performance can be generated with AIS algorithms having highest detection rates and lowest false alarm rates.

1570699822 Modeling 2-D Solitary Hunting Behaviour of Chimpanzee

Wan Othman

This paper demonstrates the solitary hunting behavior of chimpanzees. Two tasks, divided into one chimpanzee vs. one red colobus monkey and one chim-panzee vs. four red colobus monkeys, have been developed in Netlogo to verify the hunting behavior. Simulation results exhibited that chimpanzee prefers the youngest red colobus monkey if more than one prey are available. Nevertheless, the chimpanzee hunted without a doubt if there is only single prey.

1570695427 Comparison Between Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) for Hardware Software Partition in Embedded System

Aeizaal Azman Abdul Wahab

The complexity of embedded system design increase as the technology keeps evolving from day to day. Hardware software partitioning has been a promising approach to solve this design problem of complexity in the embedded systems, by providing a solution that automatically decides the partitioning. A lot of research has been done to automate the partitioning which focusing on exact and heuristic algorithm. Then due to the slow performance of the exact algorithms, the study focus shift to heuristic algorithms such as Genetic Algorithm (GA) and Particle Swarm Optimization (PSO). In this research the performance of both PSO algorithm and GA are analyzed in the application of the partitioning. In order to get the best among these two algorithms, hybrid combination across the two algorithms is designed. The best cost and their average time to achieve it are compared among PSO, GA and hybrid design. As a result, the graph obtained from the hybrid GA-GA-PSO required a smaller number of iterations to reach best cost. Compared to previous work, GA-GA-PSO obtained a smooth as the successive PSO graph. In conclusion, a new idea of hybrid across PSO and GA has been introduced and it results into a better solution for Hardware Software Partitioning

1570698413 Optimal Design of SMPMSM Using Genetic Algorithm Based on Finite Element Model

Syauqina Akmar Mohd Shafri; Tow Leong Tiang; Dahaman Ishak; Mohd Saufi Ahmad; Jenn Hwai Leong; Choo Jun Tan; Ong Hui Lin

This paper deals with an optimal design of a surface-mounted permanent magnet synchronous machine (SMPMSM) using a genetic algorithm method (GA). To analyze the characteristic of permanent magnet (PM) motors, the classical optimization method, such as the finite element method (FEM), is intensively used. In this design, a three-phase 12-slot/8-pole PM motor is established with FEM with radial magnetization patterns. Then, the GA is used to search the optimality of SMPMSM machine design. In the final analysis, the optimal new design of SMPMSM is demonstrated by comparing it with the initial design that is investigated by FEM. The result of induced back-EMF, total harmonic distortion, and magnetic flux density of optimal design are compared with the initial design to show the advantages of GA optimization method.

BEA: Biomedical Engineering and Applications

1570698350 Photonic Crystal Fiber-Based Surface Plasmon Biosensor for Breast Cancer Detection

Ahmet Yasli

In this work, a photonic crystal fiber (PCF) based surface plasmon resonance (SPR) biosensor designed to detect two types of breast cancer; MDA-MB-231 and MCF-7. The Full vectorial Finite Element Method (FV-FEM) with perfectly matched layers are used for numerical analyzes. The spectral interrogation method (SIM) is used to detect the refractive index (RI) variations of breast cancer cells. Also, the bending property of PCF is used to enhance the sensitivity performance. According to numerical results, the highest sensitivity results were obtained as 4500nm/RIU for MDA-MB-231 and 4643nm/RIU for MCF-7.

1570699110 Microwave Dielectric Properties and Absorption Analysis for Seashells Through Transmission-Reflection Method Using Waveguides

Cheng Ee Meng; Tan Wei Hong; Wee Choon Tan; Lim Eng Aik

This work is aim to investigate microwave dielectric behavior and microwave absorption of seashells through transmission-reflection method using waveguides. Microwave dielectric and absorption characteristic are judged through the measured reflection and transmission coefficient via two waveguides in conjunction with P-series network analyzer (PNA) from 8.2 GHz to 18GHz. Anadara granosa seashells are collected in this work for comparison . The measurement was conducted in various temperature, i.e. 35°C, 50°C and 60°C. The sample was prepared in specified dimension, according to the operating frequency range. The CST Microwave Studio are used to simulate reflection and transmission coefficient and compare with measured reflection and transmission coefficient. Results in this study reveals absorption coefficient is function of frequency and dimension. As the frequency increase, the |S11| decrease whereas the |S21| increase. Better absorption was demonstrated by seashells in room temperature than the heated seashell.

1570698631 Performance Evaluation of Optic Disc Detection Using Faster RCNN with Alexnet, Resnet50 and Vgg19 Convolutional Neural Networks

Chyong Yi Poh; Soo Siang Teoh

Automatic detection of optic disc (OD) from retinal images is essential in the diagnosis of diabetic retinopathy (DR) and other eye diseases. For examples, it is used in the detection glaucoma and neovascularisation on the disc. In this paper, the used of deep learning techniques for automatic detection of OD from fundus images is investigated. The techniques investigated are Faster Region Convolutional Neural Network (Faster RCNN) using three different pretrained networks which are Alexnet, Resnet50 and Vgg19. The effect of using input images in RGB and CIEXYZ formats on the detection performance is also evaluated. The performance is compared using four metrics: precision, sensitivity, miss rate and processing time. Fundus image dataset from DIABETDB0 is used in the evaluation. The experiment results show that using Faster RCNN and a pretrained network with deeper convolutional layers gives better result for OD detection. Faster RCNN with Restnet50 network produced the best overall results with the highest precision and sensitivity, and the lowest miss rate. It was also found that using input image in CIEXYZ format can give better results compared to RGB image.

1570699000 Effect of Image Thresholding on the Homogenized Properties of Trabecular Bone Model

Khairul Salleh Basaruddin

This paper presents a numerical study to determine the homogenized (apparent) properties of vertebral trabecular bone with different threshold values using homogenization method. Series set of micro-CT images of vertebral trabecular bone was used in the present digital image-based modeling technique to reconstruct the microstructure model. Three image thresholding values were selected based on Otsu's method. The homogenized properties that include the Young's moduli, Poisson's ratio and shear moduli was obtained in this study. The results showed there is significant effect of image threshold on the homogenized properties of vertebral trabecular bone model.

1570696163 Non-Contact Heartbeat Detection Using Viterbi Algorithm Based on Distribution of Difference of Two-Adjacent R-R Intervals

Win Zar; Hla Myo Tun

Vital sign monitoring is getting more and more attention in the field of health care. The variation of RRI (R-R Interval) is one of the vital signs that can represent mental stress conditions and heart diseases. Many non-contact Doppler sensor-based heartbeat detection methods have been proposed to evaluate the information of RRI without the device attachment. However, unwanted peaks due to respiration and small body motion could appear over the signal obtained by some signal processing, even when a subject keep still with normal breathing. In this paper, we propose a selection method of heartbeat peaks by the Viterbi algorithm. We confirmed that a Gaussian distribution could approximate the difference of two adjacent RRIs through the preliminary experiments. Based on this fact, as BM (Branch Metric) in the Viterbi algorithm, we use the squared difference of two adjacent RRIs. We evaluate our peak selection method in several peak detection methods such as (i) Spectrogram-based peak detection method and (ii) Doppler output after LPF (Low-Pass Filter)-based peak detection method. According to the experimental results, we show that our method, "Viterbi with squared BM" is effective for each peak detection method. We also show that "Spectrogram + Viterbi with squared BM" outperforms the "Doppler output after LPF + Viterbi with squared BM" method in terms of RMSE (Root-Mean-Square Error) of RRIs.

1570698703 User Interface Design for Upper Limb Spasticity Smart Diagnosis System

Zi Yang Hoe; Cheng Yee Low; Jingye Yee; Ching Theng Koh; Natiara Mohamad Hashim; Fazah Akhtar Hanapiah; Noor Ayuni Che Zakaria; Khairunnisa Johar; Nurul Atiqah Othman

Upper limb spasticity (ULS) is a medical condition characterized by an increase in muscle tone and joint stiffness upon passive joint movement. Modified Ashworth Scale (MAS) is an assessment tool to classify the severity level of spasticity. An ULS Smart Diagnosis system based on the MAS can assist the assessment process in clinical setting. A graphical user interface (GUI) has been developed to automate the data processing steps into a user-friendly interface, enabling clinicians without technical background to run data-driven machine learning models for the diagnosis of upper limb spasticity. The user interface is designed with the features of receiving sensor data and transfer it to data science platform, record and edit patient personal information, and display diagnosis with assessment result received from the machine learning models on the data science platform.

1570691520

Hyperparameter Selection in Deep Learning Model for Classification of Philadelphia-Chromosome Negative Myeloproliferative Neoplasm

Umi Kalsom Mohamad Yusof; Syamsiah Mashohor; Marsyita Hanafi; Sabariah Noor

Myeloproliferative neoplasm (MPN), is a rare type of cancer compare to tumorous cancer. Thus, delay diagnosis is common, resulting in high potentially preventable complications. This is due to the dependency on physician clinical experience and cognitive level, which may cause serious mistakes such as mistreatment or misdiagnosis. In recent years, deep learning has reached new peak in cancer classification with better expediency and accuracy than physician diagnosis. In this study, three types of MPNs namely polycythemia vera (PV), essential thrombocythemia (ET) and primary myelofibrosis (PMF) were classified using convolution neural network. In order to find the best classification output, hyperparameter tuning was applied by tweaking optimizer, input size and number of epochs. Model that shows good performance was RMSprop optimizer with input size 32x32 and 120 number of epochs which produced testing accuracy of 91.64%. Hence, this study proved deep learning algorithm can be applied to classify three types of MPNs with appropriate hyperparameter tuning.

EEI: Electrical Powers, Energy and Industrial Applications

1570694224 Numerical Analysis of the Effect of Pore Size Toward the Performance of Solid Oxide Fuel Cell

Wee Choon Tan; Lim Eng Aik; Cheng Ee Meng; Tan Wei Hong

The effect of the anode pore size is numerically investigated with the aids of artificial solid oxide fuel cell (SOFC) microstructure information. The standalone effect of the pore size is impossible to be realized by the experimental approach. Additionally, the complete real microstructure information is also limited in the open literature as it required sub-micron 3D imaging equipment. The dusty-gas model is implemented into the developed quasi-3D SOFC model for the gas diffusion in the anode. The model with real microstructure information is successfully validated. The actual anode pore radius of 0.283 µm is artificially replaced with a radius of 0.025, 0.050, 0.250, 0.500, and 2.500 µm. Decrement of area-specific reactant (ASR) for the anode concentration is found with the increment of pore radius. Also, such increment promotes a small increment of ASRs for the anode activation and the anode ohmic loss.

1570696295 Power Quality Enhancement in Stand-Alone PV System Using Leaky LMS Adaptive Algorithm

Liqaa Alhafadhi; Jiashen Teh

The use of photovoltaic (PV) systems has increased steadily in the last few years due to the high demands on clean energy in different daily usages. However, the delivered power is still unstable most of the time due to the constant changes in the weather conditions. The fluctuation in the solar irradiance creates harmonics in the generated power that might leads to undesirable performance of PV system. Total harmonic distortion (THD) is the most common way that has been used as an indication of how much distortion the signal has. It is the ratio of the power contained in the harmonics to the main power of the signal. In order to reduce THD in the output and enhance the power quality of the PV systems out-puts, different techniques such as maximum power point tracking (MPPT) and power electronics connection topologies such as multi-level inverter (MLI) and control strategies such as variable duty cycle pulse width modulator (PWM) have been used. Despite all the progress that has been, the output signal still suffers from THD which consequently leads to poor power quality. This paper presents a new method of THD in PV system using Leaky LMS. The distorted signal was processed by adaptive filter before it is delivered to the load and the THD within the signal was reduced dramatically.

1570698692

Agrivoltaic Systems: An Innovative Approach to Combine Agricultural Production and Solar Photovoltaic System

Mohd Ashraf Zainol Abidin; Muhammad Nasiruddin Mahyuddin; Muhammad Ammirrul Atiqi Mohd Zainuri

Agrivoltaic system (AVS) is a conceptual and innovative approach to combining agricultural production with renewable energy. During profound disruption and instability to the energy sectors globally caused by pandemic Covid-19, renewables, especially solar power, are forecast to continue to grow when the world starts to recover from this pandemic. Concurrently, food security issues have become worse and will continue to escalate due to a significant agricultural land decrease. Thus, this conceptual paper describes the core issues of challenges and opportunities for effective dissemination of dual land-use systems (AVS) as an innovative approach and a win-win solution for both productions. The definition and classification of AVS technology, the specification and modification of PV structure for AVS system, and agricultural experts' concern are discussed in this paper as a suggestion for refinement of AVS technology to increase the rate of adoption by players in the industry. Building renewable energy and agriculture sustainable solutions would ultimately increase global land-use efficiency, minimize agriculture destruction, and reduce greenhouse gas emissions from fossil fuels. Informed and organized efforts to disseminate further this innovation strategy are required if increasing demands for renewables and food security are to be met simultaneously.

1570698661

Fitness-Inspired for Mobile Charger

Hasliza Hassan

Bicycle is known as one of the popular transport options among students to go to class. It is also used for students to do some lightweight exercise. There is waste of human energy in the sense of friction and expanded heat as the bicycle moves without being noticed. The wasted human energy would be useful if it were captured and converted into usable electric power. The process of capturing and converting human energy into electrical energy is known as energy harvesting. By considering energy harvesting as one of the alternate supply energy, it can be a help to reduce the using of fossil fuel, restoring the green environment and to reduce the future risk of energy supply uncertainty This project investigates by use of a bicycle to harvest human energy using a 545 DC motor generator. The power generated by the cycling can either be used for charging the mobile phone or can be stored in a power bank for later use. A hardware prototype of this project is developed and tested for charging the mobile phone and power banks

1570695861 Determination of Solar Penetration Through Multi-Objective Optimisation Framework

Farihan Mohamad; Jiashen Teh

The integration of solar energy has been on the rise, owing to its mature technology that consistently driving down the cost of production. Planning these investments require considerations of reliability, economic and environmental risks, which eventually turn into a multi-objective optimization problem that this work intended to solve. Results have shown that the framework is able to realistically optimise the capacity level of the solar systems without being heavily biased to any of the risk considerations.

1570695864 Reliability Impacts of ICT Failures on Synchrophasor Based Dynamic Thermal Rating System

Bilkisu Jimada-Ojuolape; Jiashen Teh

The addition of Information and Communication Technology (ICT) Infrastructure has made the cyber power network more intelligent and efficient. This improves reliability and sustainability by incorporating intelligent infrastructure such as phasor measurement units (PMUs), smart sensors, that aids two-way communication, provides monitoring features amongst other vast benefits. The deployment of these technologies, such as dynamic thermal rating systems (DTR), system integrity protection schemes (SIPS), demand-side management (DSM), has advantages. However, they have certain drawbacks such as component and communication network failures as well as cyber intrusions which can worsen the reliability of the existing network. This study presents a DTR system that incorporates Wide Area Monitoring (WAM) functions by using PMUs and examines ICT contingencies impact on cyber-physical network reliability. The paper proposes a Monte Carlo simulation approach to explore the consequences of ICT component failures on system-wide indices, and this approach is analyzed on the IEEE RTS which is modified to demonstrate the benefits of ICTs further. The findings indicate that reliability improves significantly with the use of PMUs, but failures of such components also have negative impacts on network reliability.

1570696141

Comparison of Total Harmonic Distortion and Common Mode Voltage in Cascaded H-Bridge Multilevel Inverter with Switching Angles Derived Using Non-Iterative Calculation Techniques

Yee Wei Sea; Wui Ven Yong; Siok Lan Ong; Jenn Hwai Leong

Three-phase two-level pulse-width modulation (PWM) inverter has several disadvantages, such as higher switching losses, higher voltage stress on power switches, higher voltage harmonics content, and higher common-mode voltage (CMV). Compared to 3-phase 2-level PWM inverter, multilevel inverter (MLI) offers several advantages, such as higher efficiency, lower voltage stress on power switches, reduced output voltage total harmonic distortion (THD), lower CMV, and less electromagnetic interference. Switching angles applied to MLI must be computed carefully to produce an output voltage with lower THD. In this paper, four non-iterative switching-angle calculation techniques, denoted as SMA, SMB, SMC and SMD, are investigated. A PSIM simulation model was developed to evaluate the THD and CMV of the output voltage of 3-phase cascaded H-bridge multilevel inverter (CHBMLI) controlled using switching-angles derived from the four calculation techniques. The phase and line-to-line voltage THDs, as well as the fundamental and root-mean-square CMV for 3- to 11-level CHBMLI are compared. SMC shows the lowest phase voltage THD and CMV, whilst SMD shows the lowest line-to-line voltage THD. However, the CMV resulted from the SMD techniques, especially for higher number of voltage levels, is higher than those resulted from other techniques.

1570696142

Comparison of GA and PSO Optimized Switching Angles for 3-Phase 15-Level Asymmetrical Multilevel Inverter

Wei Tik Chew; Wui Ven Yong; Siok Lan Ong; Jenn Hwai Leong

Genetic algorithm (GA) and particle swarm optimization (PSO) are well-known soft-computing optimization methods that have been applied successfully in many engineering applications. In this paper, GA and PSO are employed to optimize the switching angles for 3-phase 15-level binary asymmetrical cascaded H-bridge multilevel inverter (ACHBMLI). Both optimization algorithms are adapted and integrated into a selective harmonic elimination pulse-width modulation (SHEPWM) based switching-angle calculation technique that aims to eliminate the undesired harmonics while maintain the desired fundamental harmonic. The performance of GA- and PSO-SHEPWM are compared in term of switching angles, objective function, cumulative distribution function and total harmonic distortion. For fair comparison, both GA- and PSO-SHEPWM are implemented and analyzed in MATLAB with the same population size and total number of iterations. Furthermore, a PSIM simulation model of 3-phase 15-level binary ACHBMLI has also been developed to validate the effectiveness of the optimized switching angles obtained by the GA- and PSO-SHEPWM.

TECHNICAL SESSION 5

VIS: VISION, IMAGE AND SIGNAL PROCESSING

1570697306 Fast and Memory Efficient Acoustic Identification System Based on Diagonal I-Vector Extraction

Noor Salwani Ibrahim; Dzati Athiar Ramli

I-vector model has become the state-of-the-art technology for speaker recognition. Nevertheless, the I-vector extractor is relatively slow and it requires huge memory consumption which is not efficient for some real applications. Therefore, this paper introduces an efficient technique to the I-vector feature extraction namely Diagonal I-vector (D I-vector). The performance comparison was executed between I-vector, Eigen-decomposition and D I-vector using bio-acoustic dataset taken from our in house compiling database from Intelligent Biometric Group Universiti Sains Malaysia Database consisted of 55 species and 2656 samples of bio-acoustic syllables. Experimental results have demonstrated that the proposed method is faster and more efficient than the original I-vector with small performance degradation. It is observed that the time ratio of CPU time and memory is 1.13 for the D I-vector compared to 4.21 for the original I-vector. Eigen-decomposition is set to be the benchmark for time and memory.

1570697652 Boundary Accuracy of Interactive Segmentation Methods on Various Distorted Images

Bahbibi Rahmatullah; Siti Mahamud; Khairul Fikri Tamrin; Suzani Samuri

Quality of image is an important factor to be considered in coming up with effective segmentation algorithms. As images go through several different stages of processing such as acquisition, compression, transmission, storage, and reproduction, these digital images are easily exposed to various types of degradation leading to the deterioration of image quality. Many state-of-art segmentation methods are not prepared to handle the various level of degradation in visual quality. This paper aims to address this issue by comparing and analyzing the performance of two types of interactive segmentation methods on images with common types of distortion artifacts. The well-known Jaccard index for measuring boundary accuracy is used for evaluation of the segmentation output. The experimental results revealed interesting and unique findings of segmentation accuracy on different levels of distorted images. This indicates that the image quality plays an important role in segmentation accuracy and the need to consider the distortion effect towards achieving higher accuracy in segmentation.

1570697683 Remote Spoken Arabic Digits Recognition Using CNN

Zoubir Talai

While Arabic is the fifth most spoken language in the world, it still lacks powerful speech recognition systems. Moreover, recent advances made in artificial intelligence and deep learning have widely benefited well-resourced languages, while the development of Arabic speech recognizers is still modest. In this paper, we contribute to bridging the gap between the resources of Arabic and those of the well-resourced languages, in particular in the context of remote communications. As the non-availability of dedicated corpora is the most problem that pre-vents the development of Arabic products, we built a corpus composed of the ten Arabic digits. The corpus was collected remotely, over-connected smartphone apps, and social media. Then the convolutional neural network algorithm is trained to recognize the digits. Initial experiments faced an overfitting problem due to insufficient data. To overcome this problem, we artificially expand the training dataset with audio data augmentation techniques. In further experiments, we explored cross-corpora speech recognition. The results showed the potential of the proposed approach in remote speech recognition conditions.

1570693734 DE1-SoC FPGA Support for Human Posture Detection System

Ahmad Nazri Ali

Detecting the human posture is one of the challenging problems in machine vision. However, with the advancement of deep learning technique, it has brought a significant progress specifically with the support of FPGA platform. Using the TensorFlow framework and DE1-SoC platform for image acquisition system, a study aims to evaluate the effectiveness of both combinations for human pose estimation has been performed. The proposed approach significantly demonstrating a promising performance in detecting major key-points of human skeleton.

1570694638 Apply Deep Learning on Chest X-Rays Images for COVID-19 Disease Detection by Using Transfer Learning

Nguyen Thien Long Ton That; Kien Trang; An Hoang Nguyen; Bao Quoc Vuong

The outbreak of Coronavirus has caused a million fatal cases recorded globally. The challenge in dealing with the SARS-CoV-2 virus is due to its patients carrying similar symptoms with common viral pneumonia. Therefore, it is essential for doctors to recognize and differentiate the infected patients of this virus in early diagnostic steps, such as using Chest X-Ray images. For that purpose, applying transfer learning with pre-trained models is considered in this work, with the aim to single out the Corona infected images from healthy lungs or other common viral pneumonia. The Curated Dataset for COVID-19 Posterior-Anterior Chest Radiography Images (X-Rays) has been applied to train and evaluate the performance of the implemented models. The dataset consists of 4 classes with a total number of thousands of images, being Normal, COVID-19, Viral - Pneumonia, and Bacterial - Pneumonia, respectively. The high accuracy recorded results from the dataset help to nominate the suitable models for early recognition of Corona infected patients, which allows early intervention and the possibility of being completely cured of the deadly virus.

1570698603 Comparative Analysis of Image Enhancement Techniques Based on Fundus Image for Diabetic Retinopathy

Nor Hazlyna Harun; Noor Halawati Binti Che Meh

Enhancement of images plays significant role in certain aspects of scientific research. One of the main task is analyzing the abnormal features in retinal fundus image for detection of diabetic retinopathy. However, there are many techniques that have been developed and there is no proof to which technique is the most suitable for retinal fundus image. This paper intended to compare different image enhancement techniques in order to obtain a clearer vision of the abnormal features. Study for comparing these techniques is developed to evaluate the enhancement techniques by obtaining the performance metric values in terms of PNSR, MSE, NIQE and entropy. Results show that different enhancement techniques have their own ad-vantages and in this study, CLAHE technique shows the best value for MSE performance evaluation.

1570698608 Improved of Morphological Features Visualization for Diabetic Retinopathy Disease by Using Image Enhancement Technique and Optimization Algorithm

Nor Hazlyna Harun; Nurul Atikah Mohd Sharif

This article provides a comparative study of strategies for identifying diabetic retinopathy (DR) in the fundus feature enhancement. Medical images suffer from non-uniform lighting, low contrast and noise, and such images will go through pre-processing. A comparative study and efficiency assessment of different optimization strategies can help to choose the most effective technique which can significantly improve diabetic retinopathy identification. In detecting DR, pre-processing of the fundus image has been made by comparing histogram equalization (HE), image negative, dark contrast stretching, bright contrast stretching and partial contrast stretching. These techniques are evaluated by using standard performance metrics like NIQE, PNSR, MSE and entropy, then optimization using Cuckoo Search Algorithm has been conducted to compare the result. In the last stage of the result, the proposed optimization, produces better result in some of the performance metrics like MSE, meanwhile NIQE, PNSR and entropy shows better results in enhancement. Hence, the physical image after enhancement and optimization can be useful to researchers to further analysis on detecting the DR

1570694516 Analysis on Single-Image Super-Resolution (SISR) Using Dictionary Learning and Sparse Representation Algorithm

Suit Mun Ng; Haniza Yazid; Nazahah Mustafa

Image Super-Resolution (SR) is a technique in order to produce High-Resolution (HR) image from the corresponding Low-Resolution (LR) image by removing the degradation caused by imaging process of LR camera. In this work, a Single-Image Super-Resolution (SISR) image reconstruction scheme based on dictionary learning process with sparse representation method is proposed. As a result, the image quality of the obtained HR image decreased significantly with increasing of the upscale factor. Then, the HR image was obtained by applying the proposed work produced a better performance in terms of Root Mean Square Error (RMSE), Peak Signal-to-Noise Ratio (PSNR) and Structural Similarity Index Matric (SSIM) values as compared to the bicubic interpolation operation. Therefore, the work done in this paper is able to solve the LR problem in images by proposing a SISR image reconstruction scheme based on dictionary learning process with sparse representation algorithm. Lastly, this work can be improved by testing on different types of images such as biometric images.

1570698810 Automatic Honey Bee Queen Presence Detection on Beehive Frames Using Machine Learning

Marie-Pier Marquis; Yacine Yaddaden; Mehdi Adda; Guillaume Gingras; Michael Corriveau-Cote

A honey bee queen plays a vital role in a bee colony. Thus, locating it in a beehive frame is one of the important tasks performed by the beekeepers. However, searching for the queen bee with the naked eye is time consuming and its effectiveness largely depends on the quality of the beekeeper vision. Therefore, we propose two methods to automate this operation using machine learning techniques. We evaluated both methods and the obtained results are promising and highlight their efficiency.

1570698904 Investigation on Face Alignment Factor for Generating Forensic Sketch Using Deep Convolutional Generative Adversarial Network

Muhamad Faris Che Aminudin; Samsul Setumin; Shahrel Azmin Suandi

Over the years, deep learning algorithm has been rapidly improved by various architectures and optimization. Convolutional neural network (CNN) is usually the prominent architecture used for deep learning due to its effectiveness. Recently, a new architecture which is Generative Adversarial Network (GAN), becomes a popular research topic. GAN can be categorized as a generative model that is usually used to generate data similar to data distribution of what it is trained. This type of generative model is used for prediction and generating new data similar to the original distribution. Deep convolutional GAN (DCGAN) has shown that it can generate images effectively by introducing convolution layers into normal GAN. This architecture helps in generating synthetic images where the data is limited. This paper investigates face sketch images synthesis to study how face alignment affects the generated image using the DCGAN. The results show that using aligned images as training data improved the generated images visually and when trained with classifier it shows that it has 88% similarity to original images compared to using unaligned images.

1570698931 Review on Generative Adversarial Neural Networks (GAN) in Text-To-Image Synthesis

Muhamad Faris Che Aminudin; Shahrel Azmin Suandi

In recent years there is a spike in text-to-image synthesis research. Most of the researches use Generative Adversarial Network (GAN) because of its effectiveness in generating a realistic synthetic image. In this paper, we provide several recent papers that focus on GAN based text-to-image synthesis and discuss their architecture, advantages of the model, dataset, and evaluation metric.

1570699239 Real-Time Mobile Application for Handwritten Digit Recognition Using MobileNet

Norizan Mat Diah

Real-time mobile application for handwritten digit recognition helps children learn how to write a single digit at their own pace, in a fun and straightforward approach. It can improve and strengthen the children's knowledge and skills in writing digits. One of the problems children have in learning how to write digits is mirror-writing in which the digits or numbers are written as if they are a reflection from a mirror. Convolutional Neural Networks (CNNs) have shown tremendous performance on mobile devices, including Android and iOS, with low computational cost and yet producing high recognition accuracy. Two popular CNNs for mobile applications are MobileNet and ShuffleNet. This project reports our preliminary investigation, comparing MobileNet and ShuffleNet performance for real-time mobile application for handwritten digit recognition. Preliminary experimental analysis trained with some randomly selected images from the MNIST dataset indicates that MobileNet produces 0.9442 accuracies than ShuffleNet, which is just 0.6883. MobileNet performs the best among the two models. Our mobile application employs MobileNet for handwritten digit recognition with a simple and user-friendly interface to be tested by children four to six years old. In this application, children can write using one of their fingers or stylus using the mobile phone. The findings show that MobileNet is beneficial for real-time mobile application for children to learn writing digits.

1570699754 Small Object Detection Based on SSD-ResNeXt101

Uus Khusni; Aniati M. Arymurthy; Heru Susanto

Object detection is closely related to video analysis and image retention, which has attracted many researchers to research in this field. Traditional object detection methods are built with hand-crafted features and shallow trainable architectures. The resulting accuracy of traditional object detection is very much influenced by the selected features. The development of the field of Artificial Intelligence (AI), especially Deep Learning (DL), has made DL a powerful model for object detection. This is because DL has semantic analysis capabilities, high-level, deeper features, which are problems that often arise in traditional object detection. However, there are a few things that need to be fixed regarding the application of object detection in the real world because there are many small objects and varied backgrounds. Manual labeling of small objects is quite a time consuming and costly. The lack of a dataset to train small objects greatly affects the accuracy of the Convolutional Neural Network (CNN) model that was built. Single Shot Multibox Detector (SDD) as an object detection framework can detect objects of different sizes. To improve SSD accuracy in detecting small objects, in this paper, we replaced the SSD backbone using ResNeXt101. The experimental results yield better accuracy than the previous SSD framework with ResNet101. SSD(ResNeXt101) reach accurate 69.21% while SSD(ResNet101) with accurate 67.03%.

1570696183 GSM Based Bank Vault Surveillance Process with Finger Print and Password and Preventative Action Against Unauthorized Person

Kosar Kosar; Mohamed Fauzi Packeer Mohamed; Naeemul Islam; Rabiul Hasan Tarek; Md. Fahim Shahrier Khan

The objective of this research is to model and accomplish a bank vault surveillance process based on Fingerprint, password and GSM technicality which can be established in a bank, impervious offices and homes. This technique is authenticating and validates the users that can unlock the door in the real-time if any mismatch occurs in the identification process. On that time, a notifications SMS will be sent to the authorized person via GSM, after checking the CCTV view he or she can take necessary steps sending some commands which will activate the preventative action device such as shocking device, anesthesia can be done when the sensors power switched on at no office hours and holiday time where motion sensors, vibration sensor, and reed switch will activate and the sensors detect unauthentic person movement and work. As a result, it will give the best solution to apprehend the thief in a vault.

1570697444 Defects Detection Using Complementary Split Ring Resonator

Shin Yee Tan; Muhammad Firdaus Akbar; Nor Azlin Ghazali; Mohamed Fauzi Packeer Mohamed

Composite materials are widely used in metal coatings to form a series of protective layers. However, fatigue, stress and corrosion can cause several damage modes such as delamination between insulation and metal surface and crack of metal. Such defects will consequently weaken the structure. Hence, it becomes essential to detect and remedy the area non-destructively before it spreads any further. In this paper, a novel of microwave non-destructive testing (NDT) technique for composite coatings is proposed. This technique is based on scanning the surface of the coating with a Complementary Split Ring Resonators (CSRR) with a microstrip patch antenna (MPA). The average value of magnitude S11 is analyzed. Here, a sample (miniature defect) is scanned using CSRR operating at microwave frequencies of 5.3 GHz. Then, the simulation is carried out by using CST Studio Suite. After applying Wavelet transform to the average value of magnitude S11, the surface plot showed significantly better depth resolution. The results reported in this paper proves the advantages of the Wavelet transform to picturize the depth of the defects. The defects' information can be used to further develop improved methods for maintenance schedule involving significant localized damage and essential for safety studies.

1570698948 Fined-Grained Vehicle Classification in Urban Traffic Scenario Using Deep Learning

Syeda Aneeba Najeeb; Rana Hammad Raza; Adeel Yusuf; Zamra Sultan

The increasingly dense traffic is becoming a challenge in our local settings, urg-ing the need for a better traffic monitoring and management system. Fine-grained vehicle classification appears to be a challenging task as compared to the vehicle coarse classification.Exploring a robust approach for vehicle detection and classi-fication into fine-grained categories is therefore essentially required. The existing Vehicle Make and Model Recognition (VMMR) systems have been developed on synchronized and controlled traffic conditions while the need for robust VMMR in complex, urban, heterogeneous, and unsynchronized traffic conditions still remains an open research area. In this paper, vehicle detection and fine-grained classification are addressed using deep learning. To perform fine-grained classification with related complexities, local dataset THS-10 having high intra-class and low interclass variation is exclusively prepared. The dataset consists of 4250 vehicle images of 10 vehicle models, i.e., Suzuki Ravi, Suzuki Bolan, Su-zuki Alto, Suzuki Mehran, Honda City, Suzuki Cultus, Honda Civic, Suzuki Swift, and Suzuki WagonR. Due having almost no design variation in some make and models over the years, the vehicle models are not separated by their year of generation. Two approaches have been explored and analyzed for the classification of vehicles, i-e, fine-tuning, and feature extraction from deep neural networks. A comparative study is performed, and it is demonstrated that compar-atively simpler approaches can produce good results in the local environment hence reducing the computational stress and time such as finetuning inception v3 which produced the highest accuracy of 97.4% with the lowest misclassification rate of 2.08. Finetuning Mobilenet v2 and ResNet-18 produced 96.8% and 95.7% accuracies, respectively. Extracting features from fc6 layer of AlexNet produces the accuracy of 93.5% with a misclassification rate of 6.5.

COMBINE SESSIONS

1570696630 Development of Drowning Detection Algorithm for USV

Min Kang Chew; Chow Yeh Loh; Sam Ren Jie Yap; Jing Pei Tan; Hermawan Nugroho

Drowning is one of the leading cause of unintentional injury related-death world-wide. Development of an early warning system can prevent drowning accident. Most of drowning detection methods are for swimming pools. Here, we develop a drowning detection algorithm which can be implemented on Unmanned Surface Vehicle (USV). The algorithm is based on SSD MobileNet v2 which is trained with the developed dataset. Experiment shows promising result with a good average precision (50.9) and it is shown that the algorithm is potential to be used in real situation.

1570698903 Development of Standstill Monitoring System (SMS) for Inhouse Agriculture Product Application

Sheikh Mohamad Naim bin Shatir; Abdul Halim Ismail; Mohammad Nishat Akhtar; Mohamad Nazir Abdullah; Elmi Abu Bakar

This research focuses on developing a cost-effective and reliable Standstill Monitoring System (SMS) from entire concepts of smart farming system. The SMS architecture consists of several modules of sensors, wireless communication with the integration of normalized difference vegetation index (NDVI) imaging to analyse the health condition of a mango tree or any fruit bunch in terms of nutritional value and nutrition-deficiency related disease. The components are attached to a customize tripod, where the tripod can then be placed at a mango farm for example or any fruit bunch before crop harvesting process application. The system not only monitors the farm environment but also transmit data remotely as well as receive user's input. To further enhance the data analysis, an expert's advice is also taken into account regarding the age of mango trees as a case study. Moreover, the selection of type of fertilizer and type of soil is recorded for references in entire harvesting process. This ongoing project is still in prototype & development stage whereby, the parameters and its associated variables are monitored during the growth of fruit bunch from initial stage. With an advent of the emergence of the proposed portable, affordable and effective SMS for smart farming system would allow farmers to monitor their farm or any fruit bunch from a distance and thus, would allow them to reap the benefits.

1570699540 Hold Violation Fix with Physical Awareness to Minimize Impact on Congestion

Faris Naim Ghazali; Nur Zatil 'Ismah Hashim

Static Timing Analysis (STA) is one of the essential analysis in physical design. It is needed to evaluate the design performance in terms of timing. One type of violation that is critical to overall design is called as hold violation. Hold violation can be fixed by slowing down the data path through addition of buffer. However, in standard timing report, no physical information is available thus, adding buffer might affect the existing congestion in the design. To rectify this issue, physical awareness is needed when implementing hold timing fix. In this work, cell area utilization is generated from Place and Route (PnR) database and merged with timing report from STA. Based on the timing report with the incorporation of area utilization, the hold fix is implemented by using endpoint hold fix technique. The results show that the average endpoint area utilizations is 65.29% and 11.04% for moderately congested (referring to approximately 100 GB database size) and lightly congested (referring to approximately 15 GB database size) database, respectively. In addition to that, the proposed method able to fix the hold violations whilst achieving the congestion deviation before and after Engineering Change Order (ECO) within 1.1 % for moderately congested database and 0.0008% for lightly congested database. Therefore, hold violation fix with physical awareness indeed demonstrate a viable method in fixing hold violation with minimal impact on the design existing congestion.

1570699715 Robotic Exoskeleton Safety Compliance, Evaluation Development Tool and Application

Renann G Baldovino; Nilo T. Bugtai; Voltaire B Dupo; Michael Manguerra; Alexander Abad; Francis Belista

Over the past decade, the development of robotic-assistive devices had increased significantly. Most studies performed are with laboratory tests and few promising ones have gone to clinical studies for use and evaluation on humans. It is utmost important especially in the biomedical engineering field that the device should be evaluated using the best possible safety protocol which is tailored to machines working directly or in contact with humans. In the present situation, only few standards discuss the issue of using robots in human clinical trials. This paper goes to a review of the existing materials to evaluate a robot that works within this type of utilization for a specific preparation for the device to be considered as ready for use in a clinical investigation. This process commonly uses standards that give a general recommendation for how a device should work to be deemed safe. In practice, these standards recommendations are organized into a checklist for the evaluation of the safety level of a robotic exoskeleton.

1570698816 DenseNet with Atrous Spatial Pyramid Pooling for Skin Lesion Classification

Marzuraikah Mohd Stofa; Mohd Asyraf Zulkifley; Muhammad Ammirrul Atiqi Mohd Zainuri; Asraf Mohamed Moubark

Skin cancer is one of the major causes of death worldwide. It can be screened early by identifying certain types of skin lesion that correlates to the possibility of developing into full cancer cells. It is a difficult task to distinguish between multiple types of the lesion as their appearance do not differ that much. Thus, a modified DenseNet, which is based on convolutional neural networks has been pro-posed to identify three types of skin lesions that are related to skin cancer. A net-work derived from DenseNet-264 is used as the base network, in which an atrous spatial pyramid pooling unit is integrated to improve the network capability in handling multi-scale detection. The simulation results show that the improved network has successfully identified 84.43% of the skin lesion conditions.

1570698988 A Review on Deep Convolutional Neural Network Architecture for Medical Image Segmentation

Mohd Hanafi Mat Som

Osteogenesis Imperfecta (OI) image segmentation by using Deep Convolutional Neural Network (DCNN) is yet to be evaluated. The segmentation of OI is very important as a useful tool for the medical experts to further analyze the fracture risk and avoid bone fractures. In this paper, we present the review of DCNN architecture used in image segmentation. The images were obtained from different types of modalities such as Computed Tomography (CT), Magnetic Resonance Imaging (MRI) or Ultrasound. Several architectures that have been used by the previous studies includes U-Net, faster R-CNN, ResNet, and MS-Net architecture to automatically segment the images. Overall, all researchers from the reviewed papers concluded that the pro-posed DCNN architecture gave good performance result.

1570694450 Segmentation of Tumour Regions for Tubule Formation Assessment on Breast Cancer Histopathology Images

Nazahah Mustafa

Breast cancer is the second leading cause of cancer death in women worldwide. In Malaysia, one out of 20 women will develop breast cancer once in their lifetime. Nottingham Histological Grading (NHG) system is widely accepted worldwide as the gold standard in providing the overall grade to breast cancer. Tubule formation is an important breast cancer feature used in the NHG system. Assessment of tubule formation requires pathologist to identify tumour regions. However, colour variation on breast histopathology images could provide nonstandard imaging and influence tumour regions detection. Manual identification of tumour regions using microscope may also vary between pathologists. Thus, automatic segmentation is crucial to detect tumour regions. By eliminating the irrelevant regions on breast histopathology images using automatic segmentation method, pathologist can focus on the tumour regions for further investigation. This study proposed a simple segmentation using global thresholding method to segment tumour regions on breast histopathology images. Partial contrast stretching and median filter were applied as pre-processing to provide better image quality for further segmentation processing. Post-processing using morphological operation and boundary padding were applied to enhance the segmentation results. The proposed method was able to segment the tumour regions on breast histopathology images and obtained accuracy, sensitivity and specificity of 84.22%, 85.83% and 84.89% respectively.

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