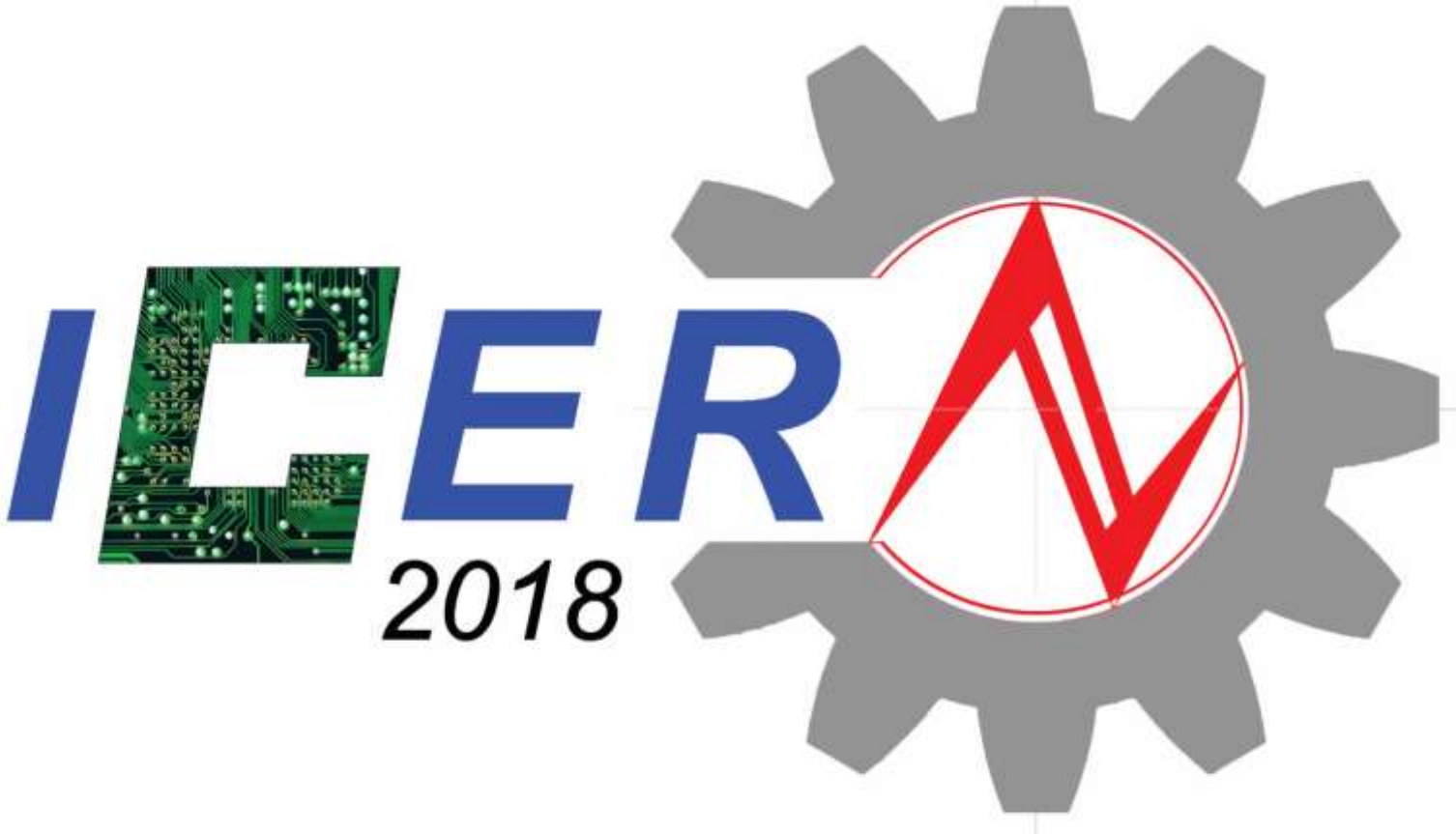
PROGRAM AND ABSTRACT BOOK

International Conference on Engineering Research and Applications

ICERA 2018

December 1-2, 2018



Springer

Table of Contents

WELCOME

Dear attendee of the ICERA 2018,

It is a great pleasure and honor for the organizing committee of this first International Conference on Engineering Research and Applications (ICERA) to welcome you at the conference. The conference venue is Thai Nguyen University of Technology, Thai Nguyen, Vietnam. This first edition of the ICERA conference promises to be very inspiring and we highly appreciate that so many researchers contributed to the rich and varied conference program and made their way to attend the conference.

ICERA is an international forum to disseminate information on the most recent and relevant researches, theories, and practices in engineering research and applications. The idea of the conference is focusing on original research work in areas including: Mechanical Engineering, Materials and Mechanics of Materials, Mechatronics and Micro Mechatronics, Automotive Engineering, Electrical and Electronics Engineering, Information and Communication Technology. The Proceedings of ICERA 2018, Advances in Engineering Research and Application will assist accomplishing the mission of spreading out the novel and latest advances in the fields of engineering. Therefore, this endeavor will definitely support both academics and professionals to reshape their thinking towards a sustainable development in the country.

Next to the keynote speakers and the invited speaker sessions, we are pleased to offer a scientific program with different sessions to choose from each time due to the many submitted contributions. This may serve you to make the most out of the program.

We hope that this conference will foster the exchange of new ideas and promote new

contacts between researchers on Engineering and Applications. We wish you an inspirational and fruitful conference, and hope that you will enjoy everything the conference and the beautiful city of Thai Nguyen!

Sincerely,

On behalf of the Organization Committee,

Assoc.Prof. Nguyen Duy Cuong

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- Assoc. Prof. Dr. Le Thu Quy, Director of Key Lab for Welding & Surface Treatment, National Research Institute of Mechanical Engineering, Ha Noi, Vietnam
- Dr. Nguyen Van Tu, Institute of Chemistry and Materials, Ha Noi, Vietnam
- Dr. Vu Thi Lien, Thai Nguyen University of Technology, Vietnam
- Dr. Van Huy Nguyen, Faculty of Electronics Engineering, TNUT, Vietnam
- Dr. Nguyen Thi Quoc Dung, Faculty of International Training, TNUT, Vietnam

Program Overview

<table>
<tr><th colspan="2">Time</th><th>Activities</th><th>Location</th></tr>
<tr><td colspan="2">7:00 - 7:30</td><td>Registration</td><td>Great Hall</td></tr>
<tr><td colspan="2">7:30 - 8:00</td><td>Music performance</td><td>Great Hall</td></tr>
<tr><td colspan="2">8:00 - 8:05</td><td>Conference opening</td><td>Great Hall</td></tr>
<tr><td colspan="2">8:05 - 8:15</td><td>Special welcome
Assoc. Prof. Nguyen Duy Cuong (TNUT Rector)</td><td>Great Hall</td></tr>
<tr><td rowspan="5">8:15 - 10:15</td><td colspan="2">Keynote Lecture
Chairman: Prof. Dr. Hamido Fujita
Prof. Dr. Banh Tien Long</td><td rowspan="5">Great Hall</td></tr>
<tr><td>8:15 - 8:45</td><td>Prof. Dr. Hamido Fujita</td></tr>
<tr><td>8:45 - 9:15</td><td>Prof. Ir. Dr. Nor Ashidi Mat Isa</td></tr>
<tr><td>9:15 - 9:45</td><td>Prof. Dr.-Ing. Habil. Kai-Uwe Sattler</td></tr>
<tr><td>9:45 - 10:15</td><td>Prof. Dr. Ramesh T. Subramaniam</td></tr>
<tr><td colspan="2">10:15 - 10:30</td><td>Commemorative photographing</td><td>A9 building</td></tr>
<tr><td colspan="2">10:30 - 11:30</td><td>Oral presentation</td><td>A9 building</td></tr>
<tr><td colspan="2">11:30 - 13:30</td><td>Conference lunch</td><td>Phuong Anh Restaurant</td></tr>
<tr><td colspan="2">14:00 - 17:00</td><td>Oral presentation</td><td>A9 building</td></tr>
<tr><td colspan="2">December 2, 2018</td><td>Conference tour (as registration)</td><td>Ba Be National Park</td></tr>
<tr><td colspan="2">December 2, 3, 2018</td><td>Conference tour (as registration)</td><td>Ha Long Bay</td></tr>
</table>

ORAL PRESENTATION PROGRAM

Time	Paper code	Authors	Title	Presenter	Room
Automotive Engineering Track 1 **Chairman: Prof. Dr. Kirill Karpukhin** **Assoc. Prof. Dr. Le Van Quynh**					
10:30 - 10:55	193	Kirill Karpukhin and Alexey Kolbasov	Research of efficiency of the system of photovoltaic converters for electric vehicle	Kirill Karpukhin	A9-304
10:55 - 11:20	76	Kien Nguyen Trung	Study of emissions and fuel economy for series - parallel HEVs on FTP-75, US-Highway-Cycle driving cycles	Nguyen Trung Kien	A9-304
13:30 - 13:55	120	Tuan Nguyen Khac, Hai Vu Van and Thai Hoang Anh	Influence of engine torque on the ride comfort of automotive vehicle	Nguyen Khac Tuan	A9-304
Automotive Engineering Track 2 **Chairman: Prof. Dr. Kirill Karpukhin** **Dr. Vo Quoc Dai**					
13:55 - 14: 20	83	Luu Do Duc and Vinh Nguyen Quang	Theoretical and Experimental Integration for Working Process Simulation on Marine Diesel Engine	Assoc.Prof. Nguyen Quang Vinh	A9-304
14:20 - 14:45	32	Dai Vo Quoc, Nam Le Ky, Hormoz Marzbani and Reza Jazar	Homogeneous Transformation and Kinematics of a Steering Tyre	Dr. Vo Quoc Dai	A9-304
14:45 - 15:10	86	Vu Van Tan, Sename Olivier and Bui Duc Tien	Improving vehicle roll stability by LQR active anti-roll bar control	Vu Van Tan, Bui Duc Tien	A9-304
Automotive Engineering Track 3 **Chairman: Prof. Dr. Le Anh Tuan** **Dr. Pham Phuong**					
15:10 - 15:35	102	Cuong Bui Van, Quynh Le Văn and Long Le Xuan	Influence of Heavy Truck Operating Condition on Dynamic Load Coefficient	Bui Van Cuong	A9-304

Time	Paper code	Authors	Title	Presenter	Room
15:35 - 16:00	113	Tuan-Anh Nguyen and Cong-Tuan Nguyen	Real-time vehicle inertia parameter estimation	Nguyen Cong Tuan	A9-304
16:00 - 16: 25	132	Nguyen Thanh Quang	Analysis of Static Loading in Automotive Powertrain System	Nguyen Thanh Quang	A9-304
Electrical and Electronics Engineering Track 1a **Chairman: Prof. Siegbert Hopfgarten** **Dr. Nguyen Tien Hung**					
10:30 - 10:55	101	Hai Do Trung and Nam Bach Van	Design of a Fuzzy Logic Controller based Genetic Algorithm for Controlling Disolved Oxygen in Wasted-Water Treatment System Using Activated Sludge Method	Nam Bach Van	A9-101
10:55 - 11:20	95	Lai Khac Lai, Nguyen Hai Vu and Thi Thanh Hoa Lai	The hedge-algebras-based controller for robotic arm	Nguyen Hai Vu	A9-101
13:30 - 13:55	39	Huu-Cuong Nguyen and Byung-Ryong Lee	A vision-based wheel disc inspection system	Huu-Cuong Nguyen	A9-101
13:55 - 14: 20	19	Mehdi Rahimi, Spencer Gibb, Yantao Shen and Hung La	A Comparison of Various Approaches to Reinforcement Learning Algorithms for Multi-robot Box Pushing	Hung La	A9-101
Electrical and Electronics Engineering Track 1b **Chairman: Assoc. Prof. Nam Tran Xuan** **Assoc. Prof. Binh Nguyen Quoc**					
14:20 - 14:45	62	Minh Nguyen, Keith Teague	Optimizing Number of Clusters for Energy Saving Purpose in Wireless Sensor Networks	Nguyen Tuan Minh	A9-101
14:45 - 15:10	15	Doan Thanh Hai, Nguyen Van Vinh, Nguyen Tat Nam, Nguyen Quoc Binh and Dao Huy Du	Propose a New Distance Degradation Parameter to Estimate Level of Out-Of-Band Emission Caused by Nonlinear High Power Amplifiers for DVB-S2 System	Doan Thanh Hai	A9-101

Time	Paper code	Authors	Title	Presenter	Room
15:10 - 15:35	77	Bao Bo Quoc, Luyen Tong Van, Duong Nguyen Hai and Hieu Ta Chi	A novel despeckling approach for ultrasound images using adaptive OBNLM filter	Bo Quoc Bao	A9-101
Electrical and Electronics Engineering Track 1c **Chairman: Assoc. Prof Tuan Do Anh** **Dr. Nguyen Minh Y**					
15:35 - 16:00	13	Phong Le Tien and Minh Ngo Duc	A New Modeling of Photovoltaic Power Generation	Le Tien Phong	A9-101
16:00 - 16: 25	52	Vu Van Thang and Nguyen Hien Trung	Optimal Planning of Renewable Sources in Micro-grids Based on Life Cycle Cost	Nguyen Hien Trung	A9-101
16:25 - 16:50	21	Kai Xue, Cédric Renaud, P. K. Chen, Sheng-Hsiung Yang and Thien-Phap Nguyen	Defect investigation in perovskite solar cells by the charge based Deep Level Transient Spectroscopy (Q-DLTS)	Nguyen Thien Phap	A9-101
Electrical and Electronics Engineering Track 2a **Chairman: Prof. Hermann Horst Puta** **Ass. Prof. Nguyen Van Chi**					
10:30 - 10:55	66	Hà Lê, Nam Nguyễn and Phước Nguyễn	PID Adaptive Tuning with The Principle of Receding Horizon	Nguyen Hoai Nam	A9-102
10:55 - 11:20	109	Hong Quang Nguyen, Quoc Tuan Duong and Nhu Hien Nguyen	Adaptive Control to Load Disturbance for Brushless DC Motor Operates at Low Speed	Duong Quoc Tuan	A9-102
13:30 - 13:55	78	Tuyen Cao Xuan and Huong Nguyen Thi	Applying the Adaptive Nonlinear Backstepping Position Controller in order to Control Angular Position of Bipolar Permanent Magnet Stepper Motors	Cao Xuan Tuyen	A9-102
Electrical and Electronics Engineering Track 2b **Chairman: Prof.Dr. Nguyen Doan Phuoc** **Dr. Nguyen Hoai Nam**					

Time	Paper code	Authors	Title	Presenter	Room
13:55 - 14: 20	111	Dinh Van Nghiep, Nhuhien Nguyen and Nguyen Thi Phuong Chi	Real-time Optimal Control of TRMS with State Dependent Riccati Equation	Dinh Van Nghiep	A9-102
14:20 - 14:45	24	Jonas Spindler, Siegbert Hopfgarten, Evgeny Lazutkin and Pu Li	Situational Nonlinear Model Predictive Control for Autonomous Driving	Dr. Siegbert Hopfgarten	A9-102
14:45 - 15:10	107	Huyen Dinh	Acceleration Estimation for Macpherson Active Suspension using Dynamic Neural Networks-based Observers	Dinh Thi Thanh Huyen	A9-102
15:10 - 15:35	99	Nguyen Van Sum and Lai Khac Lai	An Experiment for Nonlinear an Active Magnetic Bearing System Using Fuzzy Logic Controller	Lai Thi Thanh Hoa	A9-102
Information and Communication Technology Track 1 **Chairman: Prof. Jeng-Shyang Pan** **Dr. Van Huy Nguyen**					
10:30 - 10:55	106	Vu Dinh Minh, Le Anh Tu and Vu Duc Thai	Incorporating unsupervised and semi-supervised learning in min-max neuron network for clustering data	1	A9-302
10:55 - 11:20	91	Nguyen Van-Nui and Tran Thi-Xuan	Exploiting two-layer support vector machine to identify protein SUMOylation sites based on substrate motifs	Nguyen Van Nui	A9-302
13:30 - 13:55	100	Luong Vuong Le, Duc Quynh Tran and Quang Thuan Nguyen	A New Solution Method for Solving Transit Assignment Problems	Luong Vuong Le	A9-302
Information and Communication Technology Track 2 **Chairman: Dr. Vu Duc Thai** **Assoc. Prof. Nghia Phung Trung**					
13:55 - 14: 20	125	Dau Hoang	A Website Defacement Detection Method based on Machine Learning	Dau Hoang	A9-302

Time	Paper code	Authors	Title	Presenter	Room
14:20 - 14:45	158	Van Huy Nguyen	2S-Norm: A new score normalization for a GMM based text-independent speaker identification system	Nguyen Van Huy	A9-302
14:45 - 15:10	129	Vu Duc Thai, Dao Thi Thanh and Pao Ann Hsiung	Face and Hand Gesture Recognition for Secure Control of Equipment	Vu Duc Thai	A9-302
Information and Communication Technology Track 3 **Chairman: Dr. Minh Nguyen Tuan** **Dr. Huy Nguyen Phuong**					
15:10 - 15:35	64	Tran Manh Hoang, Nguyen Trung Tan, Ba Cao Nguyen and Le The Dung	Outage Analysis of Downlink NOMA Full-Duplex Relay Networks with RF Energy Harvesting over Nakagami-mfading channel	Tran Manh Hoang	A9-302
15:35 - 16:00	130	Jeng-Shyang Pan, Trong-The Nguyen, Shu-Chuan Chu, Thi-Kien Dao and Anh-Hung Vu	A Multi-Objective Ions Motion Optimization for Robot Path Planning	Jeng-Shyang Pan	A9-302
16:00 - 16: 25	117	Nguyễn Tiến Duy and Trần Thái Sơn	A Group Decision-Making Model with Comparative Linguistic Expression Based Hedge Algebra	Nguyen Tien Duy	A9-302
Materials and Mechanics of Materials Track 1 **Chairman: Prof. Dr. Nguyen Thien Phap** **Prof. Dr. Pierre-Yves Jouan**					
10:30 - 10:55	73	Duong The Hung and Tran Viet Thang	Dynamic responses of the one-story building frame when changing the bending stiffness	Dr. Duong The Hung	A9-303
10:55 - 11:20	146	Kavita Goyal and Meenal Singhal	Adomian decomposition method for thermal analysis of a furnace	Kavita Goyal	A9-303
13:30 - 13:55	94	Tran Ich Thinh and Pham Ngoc Thanh	Vibroacoustic response of a finite clamped laminated composite plate	Tran Ich Thinh and Pham Ngoc Thanh	A9-303

Time	Paper code	Authors	Title	Presenter	Room
Materials and Mechanics of Materials Track 2 **Chairman: Prof. Dr. Gul Zeb** **Dr. Le Xuan Tuan**					
13:55 - 14: 20	45	Julien Keraudy, Duc Tuong Nguyen, Axel Ferrec and Pierre-Yves Jouan	Comparison between DC and HiPIMS discharges. Application to nickel thin films.	Pierre-Yves Jouan	A9-303
14:20 - 14:45	53	Ly Vietanh, Vu Ngocpi, Le Xuantuan, Nguyen Duycuong, Duong Xuantruong and Gul Zeb	Chemical Metallization of Insulating Polymeric Surfaces through Simple Diazonium-based Covalent Amination	Le Xuan Tuan	A9-303
14:45 - 15:10	105	Mai Van-Tuan, Duong Ngoc-Huyen and Mai Xuan-Dung	The Efficiency Reaches a Plateau in Inverted Schottky Quantum Dot Solar Cells	Mai Xuan Dung	A9-303
15:10 - 15:35	92	Phoi Nguyen Vinh, Ngon Dang Thien and Cuong Le Chi	Evaluating the Effect of HVOF Sprayed WC-10Co-4Cr Coating and Hard Chromium Electroplated on Fatigue Strength of Axle-Shaped Machine Parts	Phoi Nguyen Vinh	A9-303
Materials and Mechanics of Materials Track 3 **Chairman: Prof. Dr. Ramesh T. Subramaniam** **Assoc. Prof. Dr. Duong Pham Tuong Minh**					
15:35 - 16:00	118	Toan Nguyen Van, Thanh Ho Ky and Dung Tran Van	Phase composition, microstructure and properties of porous Ti-3.5Nb-3.5Zr alloy fabricated by using a combined process of decomposition and vacuum sintering	Ho Ky Thanh	A9-303
16:00 - 16: 25	12	Tien Dung Do, Florent Chalon and Pham Tuong Minh Duong	Determination of the plastic zone size by using nanotest for aluminum alloy 2024T351	Do Tien Dung	A9-303

Time	Paper code	Authors	Title	Presenter	Room
16:25 - 16:50	110	Thuy Hang Nguyen Thi, Xuan Khanh Nguyen and Van Tieng Tran	Discrete element modeling of steel slag concrete	Nguyen Xuan Khanh	A9-303
Mechanical Engineering Track 1 **Chairman: Prof. Dr. Marek Balazinski** **Prof. Dr. Duong Xuan Truong**					
10:30 - 10:55	14	Do Duc Trung, Nguyen Van Thien, Hoang Tien Dung and Tran Quoc Hung	A Study on Calculating Grinding Temperature	Dr. Do Duc Trung	A9-201
10:55 - 11:20	43	The-Vinh Do and Vu Nguyen-Anh Le	Optimization of surface roughness and cutting force in MQL hard-milling of AISI H13 steel	Dr. Do The Vinh	A9-201
13:30 - 13:55	96	Nguyen Trong Mai, Do Duc Trung, Tran Duc Quy and Pham Van Nghe	Determine the ram speed and billet temperature to ensure the simultaneous two indicators surface roughness and extrusion pressure when extruding aluminum alloy	Nguyen Trong Mai	A9-201
13:55 - 14: 20	115	Do Duc Trung, Nguyen Dinh Man and Phung Xuan Son	Determine cutting force after surface roughness measurement in grinding	Do Duc Trung	A9-201
14:20 - 14:45	140	Anh Tung Luu, Ngoc Pi Vu, Thi Thu Ha Do, Xuan Hung Le and Tien Long Banh	A study on optimization of surface roughness in surface grinding 9CrSi tool steel by using Taguchi method	1	A9-201
14:45 - 15:10	119	Duong Dinh Hao, Masakazu Okazaki, Tran Hung Tra and Quach Hoai Nam	Defects morphology in the dissimilar friction stir welded T-lap-joints of AA7075 and AA5083	Tran Hung Tra	A9-201
15:10 - 15:35	70	Morvarid Memarianpour, Seyed Ali Niknam, Sylvain	Initial Tool Wear Mechanism in Dry and Lubricated Turning of Inconel 718	Marek Balazinski	A9-201

Time	Paper code	Authors	Title	Presenter	Room
		Turenne and Marek Balazinski			
Mechanical Engineering Track 2 **Chairman: Prof. Dr. Tran Ich Thinh** **Assoc. Prof. Dr. Nguyen Van Du**					
10:30 - 10:55	137	Ngo Nhu Khoa, Nguyen Thi Hoa and Nguyen Thi Bich Ngoc	Effect of the damper configurations on the vibration of horizontal washing machines	Nguyen Thi Bich Ngoc	A9-202
10:55 - 11:20	58	Khac Tuan Nguyen, Thi Phuong Thao Tran, Ngoc Pi Vu, Thi Hong Cam Nguyen and Xuan Hung Le	Optimum calculation of partial transmission ratios of mechanical driven systems using a V-belt and a three-step bevel helical gearbox	Nguyen Khac Tuan	A9-202
13:30 - 13:55	82	Ngo Thi Thao and Than Van The	An Improvement of Model Analysis for Spindle Based on Finite Element Method	Than Van The	A9-202
13:55 - 14: 20	143	Satnam Singh, Rohit Singla and Deepak Jain	Numerical investigations of ellipsoid shaped filler on heat transport behavior of reinforced polymer composites	Rohit Singla	A9-202
14:20 - 14:45	122	Thi Hong Cam Nguyen, Ngoc Pi Vu, Khac Tuan Nguyen, Xuan Hung Le and Thi Phuong Thao Tran	A study on determination of optimum partial transmission ratios of mechanical driven systems using a chain drive and a three-step helical reducer	Le Xuan Hung	A9-202
14:45 - 15:10	138	Ngo Nhu Khoa, Nguyen Thi Hoa and Nguyen Thi Bich Ngoc	Numerical modeling and experimental study on vibration of a horizontal washing machine	Nguyen Thi Bich Ngoc	A9-202
15:10 - 15:35	187	Thi Hong Cam Nguyen, Ngoc Pi Vu, Khac Tuan Nguyen, Xuan Hung Le and Thi Phuong Thao Tran	Determining optimal partial transmission ratios of mechanical driven systems using a V-belt drive and a helical reducer with second-step double gear-sets	Nguyen Thi Hong Cam	A9-202

Time	Paper code	Authors	Title	Presenter	Room
Mechanical Engineering Track 3 **Chairman: Prof. Dr. Rene Mayer** **Prof. Volodymyr Sokolov**					
10:30 - 10:55	20	Nguyen Quoc Huy Pham, Phuoc Vinh Dang and Phuoc Thanh Tran	Design of a small test rig for rotating machinery behaviors	Ngo Thanh Nghi	A9-203
10:55 - 11:20	136	Nguyen Phong Dien and Nguyen Trong Du	On a diagnostic procedure to automatically classify gear faults using the vibration signal decomposition and Support Vector Machine	Nguyen Phong Dien and Nguyen Trong Du	A9-203
13:30 - 13:55	9	Volodymyr Sokolov	Diffusion of Circular Source in the Channels of Ventilation Systems	Prof. Volodymyr Sokolov	A9-203
13:55 - 14: 20	48	Nhu-Tung Nguyen, Yung-Chou Kao, Gia Thinh Bui, Quan Nguyen, Quoc-Manh Nguyen and The-Vinh Do	An Experimental Investigation of dynamic cutting Forces in the stable milling processes	Dr. Nguyen Nhu Tung	A9-203
14:20 - 14:45	56	Michał Jankowski, Adam Woźniak and Rene Mayer	On-machine and In-laboratory Investigation of Errors of Probes for CNC Machine Tools	Adam Wozniak	A9-203
14:45 - 15:10	112	Kanglin Xing, Sofiane Achiche and Rene Mayer	The Effects of Machine Tool Pallet Change on Machine Tool Geometric Measurement using the Scale and Master Ball Artefact Method (SAMBA)	Rene Mayer	A9-203
Mechatronics and Micro Mechatronics Track **Chairman: Assoc.Prof.Dr. Nguyen Dang Hoe** **Assoc.Prof.Dr. Pham Hong Phuc**					
10:30 - 10:55	74	Vu Van The, Tran Quang Dung and Chu Duc Trinh	Optimizing of Matching Phase between two Driving Oscillations of a TFG using Diamond-Shaped Frame	Vu Van The	A9-301

Time	Paper code	Authors	Title	Presenter	Room
10:55 - 11:20	103	Nhu Cuong Nguyen, Thu Hang Nguyen, Van Luan Le, Duc Trinh Chu, Thanh Van Dau and Thanh Tung Bui	Study on Flow-Focusing Microfluidic Device with External Electric Field for Droplet Generation	Bui Thanh Tung	A9-301
13:30 - 13:55	133	Ca Nguyen Xuan, Hien Nguyen Thi, Luyen Nguyen Thi and Tan Pham Minh	Near-infrared emitting type-II CdTe/CdSe core/shell nanocrystals: synthesis and optical properties	Pham Minh Tan	A9-301
13:55 - 14: 20	22	Kien Trung Hoang, Ham Cong Vu and Phuc Hong Pham	Influence of the driving frequency on electrostatic linear comb actuator displacement amplitude	Pham Hong Phuc	A9-301
14:20 - 14:45	47	Nam Dao Phuong, Quang Nguyen Hong and Huong Nguyen Van	A new Approach Tube based Output feedback Model Predictive Control: Control Design for 2D Overhead Crane	Dao Phuong Nam	A9-301
14:45 - 15:10	85	Chi Tran Nhu, Ha Tran Thi Thuy, An Tran Hoai, Nguyen Ta Hoang, Hoai Nguyen Thi, An Nguyen Ngoc, Trinh Chu Duc, Van Thanh Dau and Tung Bui Thanh	Experimental Characterization of an Ionically Conductive Fluid Based High Flexibility Strain Sensor	Tran Nhu Chi	A9-301
15:10 - 15:35	33	Thuy Le Thi Thu Thuy, Long Pham Thanh and Thang Nguyen Huu	Determining the optimal shape function based on experiment	Nguyen Huu Thang	A9-301

Keynote speakers
Abstracts

Chairman: Prof. Dr. Hamido Fujita

Prof. Dr. Banh Tien Long

Keynote speaker: Prof. Dr. Hamido Fujita

Time: 8:15 - 8:45

Location: A9 building

Cognitive Computing Facets in Intelligent Interaction based on Ontology alignment

Abstract. Human computer Interaction based on emotional modelling and physical views, collectively; has been investigated and reported in this paper. Two types of ontology have been presented to formalize a user with certain role (i.e., patient) state: mental ontology reflecting the user; role (patient) mental behavior due to certain disorder and physical ontology reflecting the observed physical collected exhibited consequences of such disorder situated due to user context. These two types of ontologies are aligned and collectively mapped on medical knowledge collected from different medical cases and scenarios. The reasoning engine to produce an interaction based on the different scenarios for mental health based on mental health guidelines.

Keynote speaker: Prof. Ir. Dr. Nor Ashidi Mat Isa

Time: 8:45 - 9:15

Location: A9 building

Intelligent Cervical Squamous Epithelial Cells Classification System

Nor Ashidi Mat Isa

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Abstract. Cervical cancer is the second most common cancer among women in Malaysia. In general, clinical diagnosis of cervical squamous epithelial cells is performed by physicians through their visual inspection on Papanicolaou smear (Pap smear) slides. In certain situations, misdiagnosis and false interpretation could occur due to technical and human errors. Technical error involves low quality of smear slides, affected by unwanted noises and/or artefacts etc. Human error, on the other hand, involves inexperienced physicians, eye fatigue, heavy workload etc. These

limitations commonly lead to longer diagnosis and prognosis times. Thus, intelligent cervical squamous epithelial cells classification system is introduced in order; (i) to be used as a second opinion that can assist physicians interpret those slides accurately, (ii) to improve the diagnosis accuracy especially in the cases of inexperienced physicians, by merging the benefits of 'empirical human' and 'explicit machine', (iii) to provide uninterrupted and faster diagnosis process. Development of the cervical squamous epithelial cells classification system involves four major components; data acquisition, data pre-processing, data extraction and data classification. Data acquisition converts information from Pap smear slides to digital numeric values (digital cervical cells images) that can be manipulated by computer system. Data pre-processing stage involves contrast and quality enhancement of Pap smear images as well as segmentation of regions of interest (ROI) (i.e. cervical cells' nucleus). Data extraction concentrates on finding significant features of images, signals or other medical modalities, which commonly used by physicians during clinical diagnosis procedure. In this study, two nucleus characteristics are extracted namely chromatin pattern and nuclear membrane irregularity. These features will then be used as attributes by intelligent neural network in data classification stage in order to classify the cervical cells into normal, low-grade squamous intraepithelial lesion (LSIL) and high-grade intraepithelial lesion (HSIL). The classification of 600 cervical squamous epithelial cells achieved 95% accuracy, 94.92% sensitivity and 95.15% specificity. The proposed system is developed with the aim to assist pathologists and cytotechnologists and hence it is hoped that the incidence as well as the mortality rate due to cervical cancer in Malaysia or ASEAN countries can be reduced.

Keynote speaker: Prof. Dr.-Ing. Habil. Kai-Uwe Sattler

Time: 9:15 - 9:45

Location: A9 building

Big Data in Engineering: Opportunities, Challenges, and Applications

Kai-Uwe Sattler

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Abstract. Modern data management technology opens great opportunities for handling and analyzing huge datasets in many application domains. This is particularly interesting for engineering fields where the task of leveraging data from measurements and process monitoring plays an important role. However, handling this massive amount of data and making sense out of this data often requires an

interdisciplinary approach combining expertise from data management experts, data scientists, and domain experts. In this talk we discuss this topic from a database technology perspective. We present opportunities in selected domains of engineering, identify challenges, and present technical solutions and trends in engineering data management. Finally, we discuss some application examples we currently try to address in our work.

Keynote speaker: Prof. Dr. Ramesh T. Subramaniam

Time: 9:45 - 10:15

Location: A9 building

Effect of Ionic Liquid and Nanoparticles on PVA-co-PE-based GPEs for the Applications in DSSCs

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Abstract. Poly (vinyl alcohol-co-ethylene) (PVA-co-PE) was used as the host polymer together with NaI as the dopant salt. The maximum conductivity of 2.27 ± 0.01 mS cm-1 was achieved with 40 wt. % of NaI salt. In respect to the 2nd system, the highest ionic conductivity 3.99 ± 0.01 mS cm-1 of was obtained by adding 10 wt. % of MPII ionic liquid; meanwhile for the 3rd system, it exhibits the highest conductivity of 3.75 ± 0.01 mS cm-1 at 4 wt. % of Ni3(PO4)2 nanoparticles. According to temperature-dependence studies, the ionic conductivity of all samples is proportional to the temperature. Not only that, all samples did consistent with Arrhenius equation which indicates that the ion transport mechanism is hopping mechanism. Then, dielectric and modulus studies were carried out to further understand the electrical properties of the GPE and the results obtained were qualitatively similar among all the systems. Besides, FTIR spectroscopy studies have been carried out. Via the studies, the existence of complexation between PVA-co-PE, NaI, MPII, and Ni3(PO3)2 was confirmed. This is shown by the shifting of the characteristic peaks, changes in the intensity and existence of new peaks. For XRD studies, the results revealed the structural properties of the GPE samples. It was also observed that the samples with higher degree of crystallinity generally have a lower ionic conductivity owing to a lower mobility. The coherent length of each sample

was calculated too. The results obtained from TGA show us that the addition of MPII ionic liquid and Ni3(PO4)2 increase the thermal stability of the GPE. Lastly, the synthesized GPEs were used to fabricate DSSC. For the iodide salt system, the highest efficiency of 3.32 % was achieved with 40 wt. % of NaI. By adding 10 wt. % of MPII ionic liquid, the efficiency increases to 4.36 %. However, the best sample among three systems is N4. It has 4 wt. % of Ni3(PO4)2 and an efficiency of 5.84 %, along with J_{sc} of 14.21 mA cm-2, V_{oc} of 0.66 V and fill factor of 62.5 %.

Oral presentation abstracts

Automotive Engineering Track 1

Chairman: Prof. Dr. Kirill Karpukhin
Assoc. Prof. Dr. Le Van Quynh

Research of efficiency of the system of photovoltaic converters for electric vehicle

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Abstract. In the modern automotive industry, the problem of CO_2 emissions in the operation of vehicles is of high relevance. Thus, hybrid vehicles and clean electric vehicles are gaining popularity. However, in terms of the mileage of an electric vehicle on a single charge in the CO_2 emissions emitted by the energy complex of different countries in the production of 1 kWh, it may be that this vehicle does not solve the whole complex of problems assigned to it to improve the environmental situation. The share of solar energy in world production is growing rapidly, and its capacity has nearly quadrupled in the last five years. Solar power plants, which were put into operation in 2017, increased electricity production by 97 GW, which increased the total power of electricity production by this method to 400 GW, which is 32% more than at the end of 2016. After analyzing the current trends, NAMI Russian State Scientific Research Center developed an electric vehicle with a system of photovoltaic converters to improve the environmental friendliness and energy efficiency of modern urban transport.

Study of emissions and fuel economy for series - parallel HEVson FTP-75, US-Highway-Cycle driving cycles

Kien Nguyen Trung[1], Tan Vu Tat[2]

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Abstract. There are numbers of alternative energy resources being studied for hybrid vehicles as a preparation to replace the exhausted supply of petroleum worldwide. The gradual decline in global oil reserves and presence of ever so stringent emissions rules around the world have created an urgent need for the production of automobiles with improved fuel economy. HEVs (hybrid electric vehicles) have proved a viable option to guarantee improved fuel economy and reduced emissions [1], [2], [3]. This work investigated the expected benefits (such as decreasing emissions and increasing fuel economy) from using the series-parallel configuration in comparison with the conventional vehicle model of FTP-75 and US-Highway-Cycle (USHC) driving cycles by using GT-SUITE software. The results show that the fuel economy can be improved significantly up to 68,79% and 42,50% on the FTP-75 and USHC driving cycles, respectively. Besides, the emissions of NO_x of the two vehicles are reduced 25,58% and 54,88%, the emissions of soot are 6,67% on FTP-75 and 50% on USHC.

Influence of engine torque on vehicle ride comfort

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Abstract. The purpose of this article is to evaluate the effect of internal combustion engine torque on the ride comfort of automobile. A dynamic model of automobiles with a 4WD transmission system is built. The dynamic simulation of the system is done with the help of Matlab/Simulink software. The root mean square value of the vertical acceleration (a_{rms}) at the vehicle's center of gravity is chosen as the criterion for evaluating the ride comfort of the automobile. The influence of cylinder number and engine throttle level on the ride comfort in different operating conditions of vehicle was analyzed. Calculation results for 4WD vehicle show that, when the engine is operating in full throttle mode, the value of a_{rms} is increased by about 9,1% compared to the case absence of engine torque; with the same throttle level and the same engine power, the more cylinder engine has, the better the ride comfort of the car.

Automotive Engineering Track 2

Chairman: Prof. Dr. Kirill Karpukhin
Dr. Vo Quoc Dai

Theoretical and Experimental Integration for Working Process Simulation on Marine Diesel Engine

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Abstract. The simulation of the working process of a marine diesel engine (MDE) is important meaning to train and to improve teams of high level crew (manager officers) on marine ship as well as providing advance research of internal combustion engines (ICE). The method that is used to model and simulate the working process of a diesel engine by thermodynamic equations with heat release in combustion and cylinder heat transfer equations is the modern one. However, there are big problems carrying it out, it is difficult to determine the input coefficients for the model. In this paper, the authors built regression models to determine input parameters (T_s, p_s) and relative coefficients (η_v, β, m_p, m_q, φ_p, φ_q) according to the engine's manufacture documents (Experimental Database, called by Reference Database, RD). The average wall temperature T_w was adjusted following the feed-back loop algorithm to ensure the error of key working process output (P_z, N_e and Q_h) between simulation results and RD below 3%. The method and simulation modelling were checked with accuracy and reliability on marine diesel engine YANMAR 6EY26W (main engine of KN168 ship) by Matlab program. The results of simulation of YANMAR 6EY26W engine on 25%, 50%, 75%, 100% load confirmed accuracy of the methodology.

Homogeneous Transformation and Kinematics of a Steering Tyre

Dai Vo Quoc[1], Le Ky Nam[1], Hormoz Marzbani[2]and Reza N. Jazar[2]

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Abstract. When steering about the titled kingpin axis, the tyre-road contact point moves along the tyre perimeter. In the literature on the tyre kinematics, this displacement, however, has not been taken into consideration. This results in an inaccuracy in the steering tyre kinematics, especially when the steering angle is large. This paper presents a novel method, utilising homogeneous transformation, to develop the kinematics of a steering tyre with the chance of the tyre-road contact being taken into account. The results show that this novel kinematic model is more accurate than those in the literature. The steering tyre kinematics developed in this investigation is then compared to that one built in ADAMS software for validating purpose.

Improving vehicle roll stability by LQR active anti-roll bar control

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Abstract. Today there are over 1.3 billion vehicles in use all over the world and vehicle rollover is a serious safety problem, which can result in large financial and environmental consequences. In order to improve the roll stability, most modern vehicles are equipped with the passive anti-roll bar system to reduce roll motion during cornering or riding on uneven roads. However, the passive anti-roll bar does not meet the required stability when the vehicle is in an emergency. This paper introduces the active anti-roll bar control which is designed by finding an optimal control, based on a Linear Quadratic Regulator (LQR). A four-degree-of-freedom half roll model that captures the essential vehicle dynamics associated with rollover phenomenon is presented. The obtained results of comparison of performance between a passive and an LQR active anti-roll bar show the significant effectiveness of the active anti-roll bar control in various maneuver situations.

Automotive Engineering Track 3

Chairman: Prof. Dr. Le Anh Tuan

Dr. Pham Phuong

Influence of Heavy Truck Operating Condition on Dynamic Load Coefficient

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Abstract. The objective of this study was to evaluate influence of heavy truck operating condition on dynamic load coefficient. A three-dimensional nonlinear dynamic model of heavy with 15 DOF (degree of freedom) was established based on Zhou Changfeng model for simulation and analysis. The tire dynamic load and dynamic load coefficient (DLC) was chosen as objective function which uses Matlab/Simulink software to simulate the full-vehicle dynamics model with nonlinear rubber suspension and calculate the objective function. The influence of the different operating conditions such as road surfaces, vehicle speeds, sprung mass on dynamic load coefficient was analyzed. The results show that the influence of the road surface roughness, vehicle speed and vehicle sprung mass on the DLC values of wheel at 3rd axle as well as road friendliness is very obvious. Especially, this study proposes that the speed limits for AD250 articulated dump truck are $v_{max} \leq$ 30km/h for the road surface condition of the ISO level D, $v_{max} \leq$ 20km/h for the road surface condition of the ISO level E.

Real-time Vehicle Inertial Parameters Estimation Based on a Simplified Half-Car Vertical Vibration Model

Assoc. Prof. Dr. Nguyen Tuan-Anh[1], MSc. Nguyen Cong Tuan[2]

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Abstract. Vehicle inertial parameters play an important role in vehicle controls, especially for active safety systems. Therefore, accurate real-time estimation of vehicle inertial parameters such as sprung mass and moment of inertia can improve vehicle safety, efficiency, and performance. This article introduces a method for estimating vehicle sprung mass and pitch moment of inertia in real-time based on a Kalman-Bucy filter (KBF) and a simplified half-car vertical vibration model. The main advantages of this method are it requires only vertical acceleration sensors for measurement and the KBF estimator is designed for a continuous time system. Simulation results for both bump and roughness road implemented in Matlab Simulink have showed that the designed filter performed effectively by rejecting the process and measurement noises and tracking the real vehicle inertial parameters.

Analysis of Static Loading in Automotive Power train System

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Abstract. While the car is moving, the load in the power train system changes continuously under specific operating conditions. Load analysis should be performed to design the components of a durable transmission system that can provide good operating conditions for cars. This article presents the analysis of static loading condition in light truck power train system with 3 tons payload. Parameters affecting the static loading condition in the transmission system include: inertial mass and tensional rigidity of the rotating parts in the gearbox, the cardan shaft, the rear axle. This study also conducted an experiment to determine the static loading in the transmission system at various operating modes through the value of torque on the transmission cardan shaft and the two half shafts of rear axle.

Electrical and Electronics Engineering Track 1a

Chairman: Prof. Siegbert Hopfgarten
Dr. Nguyen Tien Hung

Design of a Fuzzy Logic Controller based on Genetic Algorithm for Controlling Dissolved Oxygen in Wasted-Water Treatment System Using Activated Sludge Method

Do Trung Hai[1], Bach Van Nam[1]

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Abstract. This paper proposes a strategy to control the dissolved oxygen (DO) in the wasted-water system processed by the activated sludge method (ASM). The controller is designed by using the fuzzy logic approach in combination with the genetic algorithm. The performance of the control system is illustrated and verified by the simulation results in which the control strategies are implemented in the Benchmark Model (BSM1). The proposed method is also compared with the classical PI controller. The results show that the output impurities of the wasted water are in an allowed range and the quality indexes of the controller are improved and the operating cost functions of the system are lower.

The hedge-algebras-based controller for robotic arm

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Abstract. The algebra theory was developed by the group of authors in the 1990s and has had a great deal of application in various fields, such as information technology, image processing, control and automation. This paper presents the application of hedge algebras based on fuzzy logic to control the robot, including the construction of the hedge-algebras-argument system; building the hedge-algebras-based controller (HAC) structure for the n-degree-of-freedom (DoF) robotic arm; modeling, simulating the control system of 2-DoF robotic arm. The results generated by the HAC are compared with conventional fuzzy controller demonstrate the superiority and feasibility of the proposed controller.

A vision-based wheel disc inspection system

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Abstract. An automated based-vision quality inspection system for wheel-disc is presented in this paper in order to achieve nondestructive and fast defect detection method. The system captures images of wheel-disc which is located on a backlight device. Using these image data, holes in wheel-disc image are detected by ellipse detection algorithm. After that the size and positions of holes on real wheel-disc can be obtained in real time. Experimental results show that although the proposed system is fairly simple, it achieves high accuracy and reliability for wheel disc defect detection.

A Comparison of Various Approaches to Reinforcement Learning Algorithms for Multi-robot Box Pushing

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Abstract. In this paper, a comparison of reinforcement learning algorithms and their performance on a robot box pushing task is provided. The robot box pushing problem is structured as both a single agent problem and also a multi-agent problem. A Q-learning algorithm is applied to the single-agent box pushing problem, and three different Q-learning algorithms are applied to the multi-agent box pushing problem. Both sets of algorithms are applied on a dynamic environment that is comprised of static objects, a static goal location, a dynamic box location, and dynamic agent positions. A simulation environment is developed to test the four algorithms, and their performance is compared through graphical explanations of test results. The comparison shows that the newly applied reinforcement algorithm out-performs the previously applied algorithms on the robot box pushing problem in a dynamic environment.

Electrical and Electronics Engineering Track 1b

Chairman: Assoc. Prof. Nam Tran Xuan
Assoc. Prof. Binh Nguyen Quoc

Optimizing Number of Clusters for Energy Saving Purpose in Wireless Sensor Networks

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Abstract. Wireless Sensor Networks (WSNs) have a lot of efficient applications in many areas. While WSNs are quite stable, they still get obstructed with energy consumption because sensors often locate in unattended and inhospitable areas such as forest or radioactive field where human could not reach. With all energy pre-charged batteries, sensors have to keep working until running out of energy. The main goal of this paper is to find ways to improve WSNs and to make their lives longer. In this paper, we propose an energy efficient clustering algorithm that applies Compressive Sensing significantly saving energy for WSNs based on some clustering algorithms. In addition, we show the optimal number of clusters in various sensing conditions and optimize energy consumption for WSNs.

Propose a New Distance Degradation Parameter to Estimate Level of Out-Of-Band Emission Caused by Non-linear High Power Amplifiers for DVB-S2 System

Doan Thanh Hai[1], Nguyen Van Vinh[2], Nguyen Tat Nam[3,] Nguyen Quoc Binh[4] and Dao Huy Du[1]

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Abstract. The unwanted out-of-band emission caused by nonlinear High Power Amplifiers (HPAs) can raise strong Adjacent Channel Interference (ACI) to other system. In this paper, the empirical formulae to calculate quickly the level of Out-Of-Band emission (*OBE*) by a new distance degradation parameter (dd_{apsk}) based on Amplitude Phase Shift Keying (APSK) constellation are found for 16-APSK systems. System theory and simulation evaluation are used in this research. *OBE* calculated by those formulae would help in defining requirements for the stop-band attenuation of the transmitter filter to ensure the spectral mask of the system.

A novel despeckling approach for ultrasound images using adaptive OBNLM filter

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Abstract. The Optimize Bayesian Non-Local Mean Filter (OBNLM) provides a very strong tool for despeckling in Ultrasound. However, some parameters of this filter depend on the input (noise) and they are difficult to adjust. This article generates a denoising solution using the adaptive OBNLM filter in combination with the Binary Bat Algorithm (BBA) and on the no-reference Q-Metric (BBA-OBNLM). The proposed filter can despeckle noise without the need for reference images and still keep the image details, edges and textures in good condition. Furthermore, in this article, we have also carried out some simulations with images which are added speckle noise with different variances to demonstrate the performance of the proposed method superior to previous publications.

Electrical and Electronics Engineering Track 1c

Chairman: Assoc.Prof. Dr. Do Tuan Anh

Dr. Nguyen Minh Y

A New Modeling of Photovoltaic Power Generation

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Abstract. This paper presents a novel approach to complete the mathematical model for photovoltaic power generation. In this approach, the relation between the diode factor and temperature at p-n junction is added into the its mathematical model corresponding to each structure of this generation made from semiconductors. Using calculation results from the iterative and bisectional technique to determine maximum power point, the system of equations converting some parameters from standard test condition to any operational condition, datasheet published by manufacturers, the mathematical model is tested to ensure that the diode factor only depend on temperature at p-n junction. Moreover, the least square method is used to create the function representing this relation from only some pair-values. Calculated results of the proposed modeling that applied in a MF165EB3 panel show the high accuracy about value of maximum power and good meaning in control when using results of iterative and bisectional technique at any operational condition.

Optimal Planning of Renewable Sources in Micro-grids Based on Life Cycle Cost

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Abstract. This paper presents a planning framework of grid-connected micro-grids that determines power and types of renewable sources during examined period. A mixed-integer programming model is proposed with objective based on life cycle cost of project including investment cost of renewable sources, operation and energy cost of micro-grid. Constraints are also utilized to balance energy and limit power of sources. The simulation result by GAMS/CPLEX for the test micro-grid shows effects of renewable sources in micro-grid planning, including lower life cycle cost and energy cost as well as reduced emission.

Defect investigation in perovskite solar cells by the charge based Deep Level Transient Spectroscopy (Q-DLTS)

K. Xue[1], C. Renaud[2], P. Y. Chen[3], S. H. Yang[3] and T.P. Nguyen[1*]

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Abstract. Among the recent progress in solar cells, the use of the organic-inorganic hybrid perovskites as absorbers has been demonstrated to provide higher efficiency and stability for applications in photovoltaics. The improvement of the cell performance with a power conversion efficiency reaching 20% is thought to be linked to their optoelectronic properties of perovskites: strong optical absorption, high carrier mobility and diffusion length. However, from the defect point of view, the complex structure of the materials is prone to formation of defects, which enables charge carrier trapping, and therefore can impact on the long term stability and electrical property of the solar cells. In this work, we investigated defects in $CH_3NH_3PbI_3$ perovskite solar cells by the charge based Deep Level Transient Spectroscopy (Q-DLTS), which provides trap parameters including activation energy, capture cross section and trap density of different defect levels. A large trap distribution versus energy with a maximum centered at 0.45 eV was found in the studied devices. On the other hand, a strong dependency of the Q-DLTS spectra on the polarity of the sample suggests that measured traps are likely linked to the interface between perovskite and transport layers. Understanding the structure-property relationships of perovskites may help to improve the design and thus, the performance of hybrid organic-inorganic solar cells.

Electrical and Electronics Engineering Track 2a

Chairman: Prof. Dr. Hermann Horst Puta

Assoc.Prof. Dr. Nguyen Van Chi

PID Adaptive Tuning with the Principle of Receding Horizon

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Abstract. The paper introduces a method for adaptively tuning parameters of a PID controller based on the principle of receding horizon. This method does not need any mathematical model of plant, it only uses the tracking error in the past to compute PID parameters, so this method bears robustness. In addition, the parameter tuning occurs during the whole control process, hence it has a feature of adaptive regulation. Some simulations verifies possible applications of the proposed method in practice.

Adaptive Control to Load Disturbance for Brushless DC Motor Operates at Low Speed

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Abstract. Recently, control methods of Brushless DC (BLDC) motor have been intensively studied. The common control methods use two control loops with the inner loop is the current (or torque) control and the outer loop is the speed control. Conventional BLDC motors use Hall sensor mounted on the stator to detect the position of the pole in order to determine the voltage vector applied to the inverter. The use of Hall sensor to measure speed is only suitable when the motor operates at high speed because of the small resolution of Hall sensor. This means that the control quality is low when the motor operates at low speed, especially under the disturbance of torque load. This paper proposes an adaptive control method basing on speed and disturbance estimations. This control method is suitable with the motors use only Hall sensor to measure speed and with the motion control. Simulation results prove the correctness and the coincidence of the proposed method.

Applying the Adaptive Nonlinear Backstepping Position Controller in order to Control Angular Position of Bipolar Permanent Magnet Stepper Motors

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Abstract. Permanent Magnet Stepper Motor (PMSM) is defined as a high nonlinear dynamics, MIMO electromechanical incremental actuator broadly applied as a position device. The closed loop control system is proposed to enhance the performance of PMSM from the load change, steady state error, and the parameters variation that appear in the open loop control. In this paper, the proposed closed loop system is based on the Field Oriented Control (FOC) and using the nonlinear Backstepping method to design a adaptive nonlinear Backstepping position controller for Bipolar PMSM. The simulation results of the proposed controller were compared with the position control system, which uses the nonlinear Backstepping position controller for Bipolar PMSMThe simulation results show that, the performance of the adaptive nonlinear Backstepping position controller is better than the nonlinear Backstepping position controller.

Electrical and Electronics Engineering Track 2b

Chairman: Prof. Dr. Nguyen Doan Phuoc

Dr. Nguyen Hoai Nam

Real-time Optimal Control of TRMS with State Dependent Riccati Equation

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Abstract. In this paper, an optimal controller is designed for the twin rotor multi-input-multi-output (MIMO) system. The twin rotor MIMO system (TRMS) is a typical high order nonlinear system with significant coupling influences. The control outputs are positions in vertical plane and horizontal plane. The state – dependent Riccati Equation is an optimal control method for nonlinear systems.

Situational Nonlinear Model Predictive Control for Autonomous Driving

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Abstract. This paper presents a situational nonlinear model predictive control (SNMPC) approach for path following in autonomous driving. The reference path is generated using Bernstein polynomials and Bézier curves. Different criteria and weightings are determined in different driving situations. The resulting nonlinear programming problems are solved by the method of combined multiple shooting with collocation. Based on a nonlinear bicycle model, the performance of a conventional model predictive controller and the situational one is compared with a driving scenario including straight ahead driving and highly dynamic obstacle avoidance. The results show the potential for a real-time application of the proposed approach.

Acceleration Estimation for Macpherson Active Suspension using Dynamic Neural Networks-based Observers

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Abstract. This paper introduces a method to estimate the velocities and accelerations of the Macpherson suspension, whereas the system model including modeling uncertainties and exogenous disturbances. The proposed observer architecture consists of a dynamic neural network (DNN) which approximates the system dynamics online, and a continuous robust feedback RISE (Robust Integral of the Sign of the Error) term which accounts for approximation errors and exogenous disturbances. Simulations in MATLAB are performed to show the effectiveness of the proposed method.

An Experiment for Nonlinear an Active Magnetic Bearing System Using Fuzzy Logic Controller

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Abstract. This study presents an intelligent control method for positioning a nonlinear active magnetic bearing (AMB) system by using emergent fuzzy logic controller (FLC). In this work, an AMB system supporting a rotating shaft, without physical contact is presented. By using rotor dynamic model of AMB system and electromagnetic forces of magnetic bearing to design a FLC for an AMB system. The control algorithm was numerically evaluated to construct a multiple-input multiple-output mathematical model of the controlled system. The membership functions and rule design of FLC were based on the mathematical model of an AMB system. A current amplifier and hardware-in-loop (HIL) are used for electromagnetic coil to generate magnetic forces suspended the rotor in magnetic bearing. The results indicated that the system exhibited satisfactory control performance with a low overshooting and produced improved transient and steady-state responses under various operating conditions.

Information and Communication Technology Track 1

Chairman: Prof. Dr. Jeng-Shyang Pan

Dr. Van Huy Nguyen

Incorporating unsupervised and semi-supervised learning in min-max neuron network for clustering data

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Abstract. This paper proposes an improved fuzzy min-max neural network for data clustering. The proposed model incorporates both unsupervised and semi-supervised methods during training. The studies and experiments are limited to the extent of data clustering with the supplied number of clusters and spherical clusters model being not to cover each other. Our study was validated on published datasets and compared experimental results with fuzzy min-max neural networks applying to the clustering and classification problems given by the other researchers. Our solution has significantly improved the accuracy of classification with the small number of created hyperboxes.

Exploiting two-layer support vector machine to predict protein SUMOylation sites

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Abstract. In Eukaryotes species, SUMOylation is one of the most important post-translational modification playing significant roles in biological processes and cellular functions. The mechanism caused by SUMOylation process will affect many biological processes, then turn into the changes of a variety of common serious diseases, such as: breast cancer, cardiac, Parkinson's and Alzheimer's disease. Due to the very important roles underlying SUMOylation process, the requirement to have extensive knowledge on SUMOylation and its mechanism is emerging as one of the hottest issues. In this study, we will introduce an approach that exploits two-layer support vector machine to identify protein SUMOylation sites based on substrate motifs.

A New Solution Method for Solving Transit Assignment Problems

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Abstract. Congested transit assignment problems are crucial sub problems in planning public transportation systems. These problems are usually formulated in the form of non-convex optimization programs. In this work, we investigate the model given by De Cea et al. [3] that has been widely used by both practitioners and researchers. For solving this model, to the best of our knowledge, one must use a diagonalization technique in order to yield a symmetric assignment problem before applying a solution method. Consequently, the quality of the obtained solution would be possibly affected. The motivation of our work is to find a new efficient solution method to tackle directly the original assignment problem without diagonalization techniques. Basing on DC programing, we introduce a new solution method. The proposed algorithm is tested on the data given in [3]. Comparing with the existing method, the experimental results show that our approach is promising.

Information and Communication Technology Track 2

Chairman: Dr. Vu Duc Thai
Assoc. Prof. Dr. Nghia Phung Trung

A Website Defacement Detection Method based on Machine Learning

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Abstract. Website defacement attacks have been one of major threats to websites and web portals of private and public organizations. The attacks can cause serious consequences to website owners, including interrupting the website operations and damaging the owner's reputation, which may lead to big financial losses. A number of techniques have been proposed for website defacement monitoring and detection, such as checksum comparison, diff comparison, DOM tree analysis and complex algorithms. However, some of them only work on static web pages and the others require extensive computational resources. In this paper, we propose a machine learning-based method for website defacement detection. In our method, machine learning techniques are used to build classifiers (detection profile) for page classification into either Normal or Attacked class. As the detection profile can be learned from training data, our method can work well for both static and dynamic web pages. Experimental results show that our approach achieves high detection accuracy of over 93% and low false positive rate of less than 1%. In addition, our method does not require extensive computational resources, so it is practical for online deployment.

2S-Norm: A new score normalization for a GMM based text-independent speaker identification system

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Abstract. This paper presents a new score normalization method for speaker identification using Gaussian Mixture Model (GMM). The new GMM normalization method has two main advantages: (1) the thresholds are independent to dataset and mapped to the range of $[0\% \div 100\%]$ corresponding to your expected accuracy of the system and (2) better performance comparing to common methods. The experimental results suggest the viability of the proposed approach in terms of shortening the development time and providing regular update for model's parameters.

Face and Hand Gesture Recognition for Secure Control of Equipment

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Abstract. Recently, the application of hand recognition and face recognition have been installed and run in smart devices to response some demands of human life. However, in the process of recognition, there still exist difficulties such as illumination, complex background and speed in real time mode. In this paper, we propose a face and hand gesture recognition for secure control of equipment. Facial and hand gesture recognitions are combined to secure and control electrical devices. Combination between facial and hand gesture recognition still have some challenges such as same shape and same skin color between hand and face, etc. Main goal of this study is to improve the recognition ability with excellent accuracy rate, and speed up the process rate in order to satisfy real time mode in some application systems.

Information and Communication Technology Track 3

Chairman: Dr. Minh Nguyen Tuan
Dr. Huy Nguyen Phuong

Outage Analysis of Downlink NOMA Full-Duplex Relay Networks with RF Energy Harvesting over Nakagami-m fading channel

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Abstract. In this paper, we propose and analyze a downlink non-orthogonal multiple access (NOMA) relay system with full-duplex transition model and decode and-forward (DF) scheme. We assume that the source and the destinations node have fixed power, whereas relay nodes have constrained energies and should harvest radio frequency (RF) energy from the source for operation power. The full duplex is assumed and the outage performance of this system is analyzed over the Nakagami-m fading channel with imperfect channel state information (CSI). The closed-form of outage probabilities are derived and evaluated in several scenarios. Moreover, the optimal power allocation coefficients which lead to the minimal outage probability while keeping the fairness in outage performance of end users are discussed. The analytical results are verified by the Monte-Carlo simulation.

A Multi-Objective Ions Motion Optimization for Robot Path Planning

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Abstract. This paper proposes a novel multi-objective approach for optimal robot path planning based on Ion Motion Optimization (IMO). Two criteria are the distance to the target and smooth path that considered to optimize for the robot path planning issue. Location targets and obstacles are used to model mathematically the fitness function. Robots update information during the move because of partially unknown environment due

to the limited sensors in detecting range. Simulations of the robot reached to target are implemented in different scenario environments for the optimal path. The results compared with the other methods in the literature shows that the proposed approach can provide the robot achieve to its target with collision-free obstacles, and be a competitive approach for optimal robot planning.

A Group Decision-Making Model with Comparative Linguistic Expression Based Hedge Algebra

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Abstract. In this paper, we propose a new approach using hedge algebra to solve the problem of group decision-making (GDM) with the evaluation for comparative linguistic expression. According to the hedge algebra's approach, it can be computed on the semantic value of the linguistic terms. Thus, the algorithm we propose is both logical and simple in performance. In terms of the proposed algorithm, we applied a particular application, the GDM from reviewers to choose the posted article which is highest rated to award the author. The result shows its correctness and effectiveness of the proposed algorithm.

Materials and Mechanics of Materials Track 1

Chairman: Prof. Dr. Nguyen Thien Phap
Prof. Dr. Pierre-Yves Jouan

Dynamic responses of the one-story building frame when changing the bending stiffness

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Abstract. This paper proposes a model of dynamic analysis of the one-story frame with the appearance of cracks. The paper has analyzed the oscillation of the single degree of freedom system including cracks for two linear and nonlinear cases. The results obtained in this paper are the analysis of the change of the bending stiffness due to cracking (or corrosiveness, defects...) to the dynamic responses of the one-story building frame subjected to harmonic loads. The paper has found that using a nonlinear model will be an advantage for analyzing problems about changing the bending stiffness in the structures with defects.

Adomian decomposition method for thermal analysis of a furnace

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Abstract. The application of Adomian Decomposition Method (ADM) is extended to investigate all phenomenon of heat transfer, i.e., conduction, convection and radiation occurring in the hot furnace. In this work, a square furnace is considered for the thermal analysis with temperature dependent properties. There are two layers of different material in the furnace out of which one is having internal heat generation and the other one would act as an insulator. It is found from the present study that the results obtained from ADM are in good agreement with the results of the differential transformation method available in the literature. The thermal properties of the selected system, i.e., thermal conductivity

of both materials, heat transfer coefficient (inside and outside of furnace) and emissivity are considered as non-linear temperature dependent. Moreover the temperature dependent internal heat generations are also incorporated into the modeling of furnace. ADM being the semi-analytical technique for solving non-linear equations, the required temperature distribution has been obtained. In the forward problem, the temperature distributions and efficiency are investigated for various influencing parameters.

Vibroacoustic response of a finite clamped laminated composite plate

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Abstract. This paper studies the sound transmission loss across a finite orthotropic rectangular composite plate in order to understand the sound-insulating capacity at various frequencies. The plate is modeled with classic thin-plate theory and is assumed to be clamped on all four sides mounted on an infinite acoustic rigid baffle. The incident acoustic pressure is modeled as a harmonic plane wave impinging on the plate at an arbitrary angle. The sound transmission loss (STL) is calculated from the ratio of incident to transmitted acoustic powers. The numerical results and existing experimental results of sound transmission loss are compared. The influence of several key parameters on the sound isolation capability of the symmetrically finite rectangular orthotropic laminated composite plate is investigated and discussed.

Materials and Mechanics of Materials Track 2

Chairman: Prof. Dr. Gul Zeb
Dr. Le Xuan Tuan

Comparison between DC and HiPIMS discharges. Application to nickel thin films.

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Abstract. The study deals with a comparison between Direct Current (DC) and High Power Impulse Magetron Sputtering (HiPIMS) processes. We have first highlighted that the plasma of the DC discharge is composed mainly of gaseous species whereas the HiPIMS discharge leads to a plasma dominated by metal vapor and characterized by the presence of charged species of strong and low energy. For thin nickel (Ni) films, we have found the the use of HiPIMS produce denser and better crystallized layers improving the uniformity of the coating on substrates with complex geometries.

Chemical Metallization of Insulating Polymeric Surfaces through Simple Diazonium-based Covalent Amination

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Abstract. Electroless plating or autocatalytic deposition on insulating polymeric substrates via surface amination is currently of potential interest since the grafted amine functionalities significantly decrease the total quantity of noble metal catalyst and offer

good adhesion between the polymer substrate and the deposited films. Among various wet-chemical amination strategies available in the literature, diazonium-induced anchoring process appears to be very promising due to many advantages: one-step aqueous chemical process, provides covalent grafting of amine-terminated groups, carried out in open air and at room temperature. This work covers our recent studies on the grafting of aminophenyl and vinylpyridine groups through diazonium chemistry onto various polymers. We discuss the ability of these amine-terminated functionalities towards the chemisorption of acidic palladium chloride activators, which subsequently initiate autocatalytic deposition process. Our studied polymers functionalized with these palladium complexes perfectly suit the subsequent electroless nickel plating process. The covalently grafted amine groups provide excellent adhesion of the deposited nickel film on polymers. SEM, AFM, EDX and XPS techniques are used to characterize the electrolessly deposited metallic film.

The Efficiency Reaches a Plateau in Inverted Schottky Quantum Dot Solar Cells

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Abstract. Schottky lead sulfide (PbS) quantum dot (QD) solar cells (SCs) have the advantage of simple device fabrication while *pn* heterojunction SCs benefit from efficient carrier extraction induced by a front depletion region. Herein, we used low-work function transparent conducting oxide (L-TCO) to create a front contact with *p*-type PbS QD layer. The configuration, denoted as inverted Schottky, combines the mentioned advantages of Schottky and *pn* structures. A series of inverted Schottky cells having a structure of L-TCO/*p*-PbS QDs/MoO_x/Au-Ag and normal Schottky cells with a structure of ITO/*p*-PbS QD/Li-Al were fabricated for comparison. Current - voltage measurements showed that as the thickness of *p*-PbS QD layer increased the power conversion efficiency (PCE) of normal cells maximized at 160 nm while PCE of inverted cells reached a plateau. The observed plateau in inverted Schottky cells can reduce the technical difficulty in maintaining the thickness of PbS QD layer.

Evaluating the Effect of HVOF Sprayed WC-10Co-4Cr and Hard Chromium Electroplated Coatings on Fatigue Strength of Axle-Shaped Machine Parts

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Abstract. Hard chrome plating technique has been widely used to corrosion-resistant with a thickness of less than 100 μm without re-processing. However, hard chrome coating always generates the tensile residual stress and microcracks. They reduce the fatigue strength of the machine parts. Nowadays, the HVOF method has been studied as the alternative method for chrome plating. A WC-10Co-4Cr coating layer contains compressive stress and increases mechanical properties of surface details, or in other words, achieves higher fatigue strength. In this study, the influence of coating layers with thicknesses of 30 μm and 60 μm (covered by chrome-plated and HVOF technique) on the fatigue strength of AISI 1045 steel has been investigated. Results of microstructure investigation showed that the residual stress of the coating layer affected fatigue strength. The fatigue strength of tungsten carbide coating is 12.5% higher than those of chrome plating at 30 μm and 17.9% for a thickness of 60 μm.

Materials and Mechanics of Materials Track 3

Chairman: Prof. Dr. Ramesh T. Subramaniam
Assoc. Prof. Dr. Duong Pham Tuong Minh

Phase composition, microstructure and properties of porous Ti–3.5Nb–3.5Zr alloy fabricated by using a combined process of decomposition and vacuum sintering

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Abstract. Porous Ti–3.5Nb–3.5Zr alloys with different porosities from 3.02% to 22.26% were fabricated by a combined process of decomposition and vacuum sintering methods using the mixture powders of TiH_2, Nb and Zr. The effects of sintering temperature (1000÷1200)°C on the phase composition, microstructure, porosities and elastic modulus of these alloys were investigated. By controlling the sintering temperature, the peak of β–titanium phase with different intensity in X-Ray diagram was obtained. β–titanium phase and porosities have affected on elastic modulus of samples. The sample had elastic modulus from 2.42 GPa to 8.6 GPa. To optimize the technology of titanium, the experimental method of the second center of rotation in combination with experimental data processing by software Mode 5 was used. The lowest elastic modulus is 2.23 GPa in technological mode: compressed pressure in range of 160÷184MPa; sintering temperature 1000℃ and sintering time 2h. Optimized results were available for reference in the study of bio-material titanium alloy fabrication.

Determination of the plastic zone size by using nanotest for aluminum alloy 2024T351

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Abstract. The studies on crack-tip plastic zone are one of fundamental im-portance in describing the process of failure and in evaluation of the material life, it directly relates to the toughness of the material. The objective of this work is to study the crack-tip plastic

zone size. This work utilizes the ultra-low-load at nano scale to study the cyclic and monotonic plastic zone size at the fatigue crack tip based on the relationship between the hardness, elastic work, plastic work, plas-ticity index and the distance from the crack tip. The nanotest is conducted on the compact tension specimen of aluminium alloy 2024T351 with stress intensity fac-tor amplitude of 16 MPa.m1/2 at the fatigue crack tip. We found that the relation-ship between hardness, elastic work, plastic work, plasticity index and distance from the fatigue crack tip are very sensitive in the plastic zone; therefore, the cyclic and monotonic plastic zone size are determined due to these relationships.

Discrete element modeling of steel slag concrete

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Abstract. Steel slag is waste of the steel industry and the use of steel slag as coarse aggregates for concrete, as well as the constructional materials has solved the problems in the steel industry and the environment. Research on the behavior of steel slag concrete will have extremely important benefits in the application of steel slag. This paper focuses on the discrete element model to simulate behavior of steel slag concrete. The model firstly verifies by modeling the uni-axial compressive test. The numerical results will be compared with experimental results to confirm the ability of the discrete element model.

Mechanical Engineering Track 1

Chairman: Prof. Dr. Marek Balazinski
Prof. Dr. Duong Xuan Truong

A Study on Calculating Grinding Temperature

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Abstract. This paper introduces a study on calculation of the temperature in external grinding process. In the paper, based on the theory of grinding process, the relationship among grinding temperature of workpiece and cutting parameters, grinding wheel parameters, workpiece parameters…was presented. This relationship is used to predict grinding temperature of workpiece. Also, the results of calculated temperature are in good agreement with experiment data. Therefore, the results of this study can be used for prediction of the grinding temperature in practical cases.

Optimization of surface roughness and cutting force in MQL hard-milling of AISI H13 steel

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Abstract. Minimum quantity lubrication (MQL) has been applied successfully to hard milling as an alternative to flood coolant processing and dry cutting. The objective of this research is to optimize process parameters to find the minimal values of surface roughness and cutting force during MQL hard milling of AISI H13 steel with coated carbide (TiAlN) cutting tool. The characteristics of the cutting force and the surface roughness obtained under MQL condition were experimentally investigated. The experiments were conducted using the L27 orthogonal array of Taguchi's experimental design technique. The response surface methodology (RSM) and analysis of variance (ANOVA) were employed to analyze the influence of cutting parameters (i.e., cutting speed, feed rate, depth-of-cut and hardness of workpiece) on the cutting force and the surface roughness. The statistical models to predict cutting force and surface roughness under MQL condition were established.

Determining ram speed and billet temperature to ensure two indicators of surface roughness and extrusion pressure when extruding aluminum alloy

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Abstract. The paper presents a study to determine the ram speed and billet temperature to ensure that both the surface roughness of aluminum alloy bars and the extrusion pressure are the smallest. The ram speed and billet temperature are the main parameters that influence the surface roughness and extrusion pressure when extruding aluminum bars. Product surface roughness is an important indicator of the quality of extruded aluminum alloy bars. Extruded pressure affects the machine's performance and die life. By the theory of experimental combination, the authors built regression function showing the relationship between surface roughness, extrusion pressure with ram speed and billet temperature. Using the optimization method of two indicators, the author has determined the ram speed and billet temperature to achieve the surface roughness of the aluminum alloy bar product, where extrusion pressure is minimal. The results of this paper can be applied to determine the ram speed and billet temperature in aluminum alloy extrusion factories.

Determining cutting force after surface roughness measurement in grinding

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Abstract. This paper introduces a study on determining cutting force after surface roughness measurement in grinding. Based on the theory of grinding process, the mathematical relationship between surface roughness of workpiece and cutting force in grinding was presented. This relationship is used to calculate cutting forces. The results of calculated cutting forces are in agreement with experiment data. Therefore, the results of this study can be used for calculation of the cutting force after surface roughness measurement in practical cases.

A study on optimization of surface roughness in surface grinding 9CrSi tool steel by using Taguchi method

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Abstract. In this study, the Taguchi method was utilized to find the optional surface roughness in fine surface grinding of 9CrSi annealing tool steel using Hai Duong grinding wheels. Minitab 17 software was used to determine the number of experiments L16 of the Taguchi method including five cutting parameter factors namely cooling concentration (CC), cooling flow (F), cross feed (CF), table speed (V_w), and depth of cut (DOC). From the analysis results of a Signal to Noise ratio (S/N), the optimum process parameters for minimum surface roughness were proposed. In addition, it was found that the factor having the largest effect on surface roughness is the coolant concentration, followed by the cross feed, the table speed, the coolant flow and the depth of cut ranking the last. Besides, a model for determination of the surface roughness was recommended.

Defects morphology in the dissimilar friction stir welded T-lap joints of AA7075 and AA5083

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Abstract. The defect morphology in the T-lap joined by friction stir welding between AA5083-H116 and AA7075-T651 was investigated. Four typical defects were found in the joint: tunnel, bonding line, hook, and kissing bond. The experimental works showed that increasing the welding speeds would lead to the formations of tunneling and bonding line defects. The hook defects could be minimized by advancing the welding speed. The kissing bond defects seemed to be independent of welding parameters and hard to be eliminated.

Initial Tool Wear Mechanism in Dry and Lubricated Turning of Inconel 718

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Abstract. Tool wear mode and life are considered as critical machinability attributes. Three distinctive regions of tool wear, mainly known as initial wear, steady-state wear, and accelerated wear are understood to a large extent. The effects of cutting parameters on the initial tool wear have received less attention as compared to other two regions. Previous works by authors revealed that the cutting 4s could be considered as the transition period between initial and steady-state wear in turning of Inconel 718 with coated carbide tools. It is believed that adequate selection of cutting parameters in initial periods of cutting operation may tend to optimize the entire tool life. Therefore, in order to assess the effects of cutting parameters on tool wear morphology and tool wear modes at transition time 4s, various levels of cutting speed, constant levels of feed rate and depth of cut were used in dry and lubricated turning Inconel 718, which is generally considered as one of the most difficult to cut materials. The scanning electron microscope (SEM) and energy dispersive spectroscopy (EDS) were used for tool wear measurements as well as microstructural evaluation of the tool wear mode. Based on experimental observations, despite the lubrication mode and cutting speed used, adhesion and abrasion were found in almost all cutting conditions. It is believed that abrasion is initially taken place and removed the coated layer of the tool. Following this phenomenon, the adhesion is also taken place. The variation of cutting speed does not widely change the tool wear results in transition time 4s. Moreover, although negligible, higher flank wear results were found under dry conditions.

Mechanical Engineering Track 2

Chairman: Prof. Dr. Tran Ich Thinh
Assoc. Prof. Dr. Nguyen Van Du

The effect of damper configurations on the vibration of horizontal washing machines

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Abstract. This paper focuses on constructing a Matlab/Simulink program of vibration model with 2 DOF horizontal washing machine. The key point of this paper is using a strong nonlinear friction force - velocity (F-V) relationship of dampers which is obtained from experiment as an input for the simulation. The suitability and high reliability of the model were proved by comparing simulation and experimental results. The model was used to study the effect of damper configurations on the vibration characteristics of horizontal washing machines and then to propose several suitable damper configurations.

Optimum calculation of partial transmission ratios of mechanical driven systems using a V-belt and a three-step bevel helical gearbox

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Abstract. This paper introduces a study on the optimum determination of partial transmission ratios of a mechanical drive system using a V-belt and a three-step bevel helical gearbox for getting the minimum height of the system. In the study, the height of the system was chosen as the objective function. Also, in the optimization problem, the design equation for pitting resistance of a gear set was investigated. Besides, equations on moment equilibrium condition of a mechanic system including a V-belt and a three-step bevel helical gear-box and their regular resistance condition were analyzed. From the results of the study, effective models for calculation of the partial ratios of the V-belt and a three-step bevel helical gearbox were reported. As the models are explicit, the partial ratios can be calculated accurately and simply.

An Improvement of Model Analysis for Spindle Based on Finite Element Method

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Abstract. The natural frequency is a dynamic characteristic which has an importance role for the performance, accuracy and stable of a spindle as well as machine tools. In this study, modal analysis for the spindle including shaft, housing and bearing parts have been established to predict the natural frequency and mode shape by using ANSYS software. The housing that was often neglected in previous researches is included in present finite element model to improve the analyzed results. The support bearings are replaced by springs with equivalent stiffness during analysis process. The natural frequency and mode shape for different preloads are obtained. The critical speed is estimated. The results herein will provide information for engineer during developing a new design of spindle match costumer's requirement.

Numerical investigations of ellipsoid shaped filler on heat transport behavior of reinforced polymer composites

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Abstract. Nowadays polymers are the preferred as compared to their rivals due to many advantageous properties. These are mainly divided into two categories namely thermosets and thermoplastics. Epoxy, which is a thermoset polymer, can be used for the purpose of the heat transfer. Enhancement of the thermal conductivity of polymer material can be achieved with the copper filler having higher thermal conductivity. In this paper, a numerical study based on the finite element method is performed to determine the thermal conductivity of the polymer composite. The effective thermal conductivity of composite materials is investigated by considering the thermal conductivity ratio between a particle and the matrix material, with and without the thermal contact resistance and volume fraction. The results show that the effective thermal conductivity rises with an increase in filler volume fraction if the thermal contact resistance is ignored. It is also found that the thermal conductivity decreases gradually with the increase in thermal contact resistance. Moreover, the decrease of thermal conductivity dominates in case of higher volume fraction for higher thermal contact resistance.

A study on determination of optimum partial transmission ratios of mechanical driven systems using a chain drive and a three-step helical reducer

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Abstract. This paper presents a study on the optimum determination of partial transmission ratios of mechanical drive systems using a chain drive and a three-step helical reducer. In the study, the height of the cross section of the system was chosen as the objective function of the optimization problem. In addition, the design equation for pitting resistance of gear steps was considered. Besides, the equations on moment equilibrium condition of a mechanic system including a chain drive and a three-step helical reducer and their regular resistance condition were analyzed. From the results of the optimization problem, the equations for determining the optimum partial ratios of the chain drive and three steps of the reducer were presented. Using these equations, the partial ratios can be determined accurately and simply.

Numerical modeling and experimental study on vibration of a horizontal washing machine

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Abstract. This study focuses on setting up a simulation program using Matlab/Simulink for a simplified vibrational model of a horizontal washing machine with 2 degrees of freedom. A reliable experiment was carried out to define the orbit of the tub's vibration in symmetry plane that consists of the suspension system. The comparison between experimental and simulation results is used to analyze and evaluate the reliability and application scope of the model.

Determining optimal partial transmission ratios of mechanical driven systems using a V-belt drive and a helical reducer with second-step double gear-sets

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Abstract. This paper presents a new study on the calculation of optimum gear ratios of a mechanical drive system which used a V-belt drive and a two-step helical reducer with second-step double gear-sets. In the study, the objective function of the optimization problem was the system cross section area. Besides, the design equation for pitting resistance of a gear-set was considered. In addition, the equations on the moment equilibrium condition of a mechanic system including a V-belt drive and a two-step helical reducer with second-step double gear-sets and their regular resistance condition were conducted. From the results of the study, the equations to determine the optimal partial ratios of the V-belt drive and two steps of the reducer were obtained. By using these equations, the optimum partial ratios can be calculated accurately in a simple way.

Mechanical Engineering Track 3

Chairman: Prof. Dr. Rene Mayer
Prof. Volodymyr Sokolov

Design of a small scale test rig for rotating machinery characterization

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Abstract. It is well known that the static and dynamic behaviors such as natural frequency, mode shape, dynamic stiffness and damping coefficients play an important role in rotating machineries and must be identified at the beginning of the design and fabrication stage. The wrong evaluation of these characteristics can decrease the longevity or even damage machines. Consequently, it is very essential to design and build a test-rig to execute the experiments in order to investigate as well as deeply understand the behaviors of the rotating machinery. Firstly, the main features of the test-rig are characterized. Some installed sensors in this test-rigare are listed in the next part. Finally, some preliminary tests have been carried-out to validate the test-rig's functions.

On a diagnostic procedure to automatically classify gear faults using the vibration signal decomposition and Support Vector Machine

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Abstract. This study attempts to demonstrate the usefulness of an automated diagnostic procedure based on the Ensemble Empirical Mode Decomposition (EEMD) method and the Support Vector Machine (SVM) for gear fault detection and classification in a two-stage helical gearbox. First, the vibration signals measured on the gearbox casing corresponding to three conditions: normal gear, chipped gear and broken tooth gear are decomposed into different intrinsic modes by EEMD method. The standard SVM is then applied to solve a multi-classproblem of gear fault classification. It can be seen from the results obtained at a gearbox test rig that the gear faults can be clearly detected and identified by this approach.

Diffusion of Circular Source in the Channels of Ventilation Systems

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Abstract. The problem of impurity diffusion in the turbulent channel flows of ventilation systems is considered. The task is typical for ventilation systems of industrial enterprises, power units of nuclear plants, chemical industries, etc. The analytical solution of the diffusion equation for a plane circular source in a flow is obtained. The dependence for the dimensionless impurity concentration on the radius of the circular source and the Peclet diffusion number in the ventilation channel is presented. The analysis is made of the change in the concentration of the impurity from the distance to the source and the distribution of the concentration along the channel radius. Based on the conducted researches the recommendations on placement of means for controlling the concentration of impurities in the channels of ventilation systems are formed. Estimated the distance from the source, where an even concentration distribution is achieved, as well as the radius at which the actual impurity concentration corresponds to the average value.

An Experimental Investigation of dynamic cutting Forces in the stable milling processes

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Abstract. In this study, by using Taguchi method, the effects of milling type and cutting conditions on the cutting force were investigated. With four controllable factors-three levels (milling type, axial depth of cut, feedrate, and spindle speed), the most suitable orthogonal array L_{27} was performed with seven performance measurements that are maximum and minimum cutting forces in three directions (axial, feed, and normal. By ANOVA analysis with the assistance of Intercooled Stata 8.2TM software, the effects of milling type and cutting conditions on the cutting forces were analyzed and modeled. The most suitable regression of cutting forces was a quadratic regression with the confidence level of more than 97.35%. These models were verified by experiments with very promising results.

On-machine and In-laboratory Investigation of Errors of Probes for CNC Machine Tools

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Abstract. Wide range of touch trigger probes applications for CNC machine tools created a rising demand to test their accuracy. In the paper, the comparison of probe's errors characteristics' determination methods will be investigated for two different touch trigger probes for CNC machine tools. Both of the tested probes were tested in the laboratory, using dedicated test set-up. Additionally, one probe was tested on a machine tool using as material master artifact and one probe was tested on a machine tool using the dedicated test set-up. The results of these comparisons will be presented and it will be shown that on-machine probes' testing using a material master artifact does not enable to determine the accurate errors characteristic of the probe itself.

The Effects of Machine Tool Pallet Change on Machine Tool Geometric Measurement using the Scale and Master Ball Artefact Method (SAMBA)

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Abstract. The scale and master ball artefact (SAMBA) method is an indirect method for machine tool geometric error and volumetric errors estimation. It includes the hardware such as the master ball artefacts, scale bar artefact and touch trigger probe and the software based on the homogeneous transfer matrix. The hardware parts are often installed and removed from the machine tool pallet when implementing the SAMBA measurement. In this research, the experimental method has been used to discuss the effect of machine tool pallet change on SAMBA results. The results reveal that machine tool pallet change brings negligible changes on the SAMBA estimation results. However, the thermal states of machine tool appear to have a more significant effect on the final estimation of SAMBA method.

Mechatronics and Micro Mechatronics Track

Chairman: Assoc.Prof.Dr. Nguyen Dang Hoe
Assoc.Prof.Dr. Pham Hong Phuc

Optimization of Matching Phase between two Driving Oscillations of a TFG using Diamond-Shaped Frame

Vu Van The[1], Tran Quang Dung[1], and Chu Duc Trinh[2]

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Abstract. This paper presents a study on the optimization of matching phase between two outer frames of a MEMS tuning fork gyroscope by using a diamond-shaped frame. The differential motion equations of the system are established and solved via the second Newton law. The obtained results show that the anti-phase mode in driving direction is guaranteed when the exciting forces are applied to two outer frames. Remarkably, when the spring coefficient of the diamond-shaped frame increases 150%, the matching phase between two outer frames raises up 95%.

Study on Flow-Focusing Microfluidic Device with External Electric Field for Droplet Generation

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Abstract. In the recent years, microfluidics droplet has attracted remarkable research attention and has been applied in a variety of fields such as emulsion, drug encapsulation, chemical mixing. This work presents a prototype for a flow-focusing microfluidics device which is utilized to produce micro-droplet. The simulations were carried out in order to study and validate the drop generation and the effect of different factors on this process. The results show that the droplet break up process was controlled by manipulating the flow rate and external electric field. The experiments were conducted and the droplets were successfully formed and observed. These results are the necessary foundation to produce desired droplets in doing experiments in the future.

Near-infrared emitting type-II CdTe/CdSe core/shell nanocrystals: synthesis and optical properties

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Abstract. Type-II CdTe/CdSe core/shell (C/S) nanocrystals (NCs) have been synthesized with 1-octadecane (ODE) by chemical methods. The formation of type-II C/S structures were clarified by spectro-metric techniques of UV–vis absorption, photoluminescence (PL) and Raman scattering (RS). Observation results from X-ray diffraction (XRD) reveal that both CdTe core and type-II CdTe/CdSe C/S NCs crystallize in the cubic phase with zinc-blende structure. By changing CdSe shell thicknesses from 1 to 4ML, the PL peaks of CdTe/CdSe C/S NCs could be adjusted from 801 nm to 871 nm (in near-infrared), respectively. These results prove that the partial separation of photoexcited carriers is dependent strongly on the shell thicknesses. As increasing the excitation power, the PL peaks of CdTe/CdSe NCs move towards high energy and increase with a third root of the excitation power. These observations have been explained by the band bending (BB) effect, which is resulting from the spatially separated photoexcited carriers in type-II C/S NCs.

Influence of the driving frequency on electrostatic linear comb actuator displacement amplitude

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Abstract. This paper focuses on the change of displacement of Electrostatic Linear Comb Actuator (ELCA) while considering the influence of a driving frequency. A new method for determining the equivalent dynamic parameters such as stiffness, vibrating mass, and air damping factor in motion direction of shuttle (i.e. in *y*-direction) is proposed, thence establishing and solving the differential motion equation of shuttle aims to achieve a typical displacement formula. Theoretical and simulation results show that the ELCA works stably in the range of frequency from 1 to 24Hz with displacement amplitude error of 10% and driving voltage is a square wave. Moreover, the range of driving frequency for the ELCA can be extended up to 1 kHz with displacement amplitude error of 10% and the shape of driving voltage is a harmonic sine wave function.

A new Approach of a Tube based Output feedback Model Predictive Control: Control Design for 2D Overhead Crane

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Abstract. This paper presents the problem of tube based output feedback model predictive controller for a class of nonlinear, constrained, discrete time systems affected by the bounded state and output disturbances. An estimation of attraction region of the closed system is pointed out based on the combination between input state stability (ISS) theory and linear matrix inequalities (LMIs) technique. The online optimization problem guarantees the convergence of estimate states of nominal system. Furthermore, Luenberger observer can still be used in proposed control design. The theoretical analysis and simulation results demonstrate the performance of the proposed algorithm for a 2D overhead crane system.

Experimental Characterization of an Ionically Conductive Fluid Based High Flexibility Strain Sensor

Chi Tran Nhu[1], Ha Tran Thi Thuy[2], An Tran Hoai[1], Nguyen Ta Hoang[1], Hoai Nguyen Thi[1], An Nguyen Ngoc[1], Trinh Chu Duc[1], Van Thanh Dau[3], Tung Thanh Bui[1*]

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Abstract. In this study, a high flexibility strain sensor based on ionic liquid, which is a mixture of aqueous sodium chloride and glycerin pump in silicone tube, is developed. Gold-coated electrodes are inserted into both ends of the tube to make good contact with the liquid. When the silicone tube is affected by an external force, its geometry and electrical characteristics of the mixture inside the tube are changed, resulting in the change in the sensor resistance. The proposed sensor was fabricated and experimentally characterized. The 4-point resistance measurement based on alternating Howland current source was applied to the sensor for measuring the change in resistance of the sensor. A circuit board with PIC16F877A microcontroller is also developed for data acquisition and result display. Experimental results show that the sensor is highly flexible, i.e., can suffer from a stretch up to 50% with stable gauge factor in the range of 2.1 to 2.47. With its simplexes and high-flexibility, the proposed sensor has high potential to be applied to wearable and portable applications.

Determining the parameter area at the request of a physical field based on shape function technique

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Abstract. Some continuous physical quantities usually exist in the form of fields (thermal, pressure, humidity, sound, light...). In the fields, they have consecutively changing values between neighbouring points. There exist points where the same parameter intensity forms a sub-field. Determining exactly the coordinate of the sub-field is presented in this article. Here, we present the parametric intensity modeling problem in the field in a general form based on the shape function technique. Surveying this model with the Generalized Reduced Gradient method will allow determining of the points having the required parameter values. The illustrative calculations of thermal in this paper show that the solutions of both the forward and reverse problems are very fast. This technique is very effective when applied to the drying process in the paint, arranging pottery in the furnace.

Conference Tour

BA BE NATIONAL PARK

December 2, 2018

Time	Content	Note
5.am – 9.am	Depart from Thai Nguyen to Bac Kan Province	Having breakfast on the way to Bac Kan
9.am to 3.pm	Visiting Ba Be National Park: + Puong Cave + Dau Dang Waterfall + Tien Pond + An Ma Temple + Widow Island	Having lunch on the way at about 12.pm after visiting Dau Dang Water Fall

HALONG TOUR 2 DAYS 1 NIGHT (STAY OVERNIGHT AT HALONG CITY)

December 2-3, 2018

Day 1: Thai Nguyen - Ha Long Bay

5:00: We pick you up at Dong A II Hotel. Departure for Ha Long city. Halfway there, we'll stop for short break.

11:00: We arrive in Ha Long, have lunch and check in your room in Grand Ha Long Hotel.

14:00: Have time in Hoang Gia park, Sun World Ha Long Complex, enjoy Endless thrilling rides and activities.

Queen Cable car: The journey across Ha Long Bay by Queen cable car, joining Ocean station with Sun station with the Queen cable car line, is a fantastic experience not to be missed in Sun World Ha Long Park. This is the only path connecting the beach amusement complex with the mount of Ba Deo. Visitors can enjoy the ride contemplating the marvellous panoramic beauty of Ha Long Bay from atop.

Queen Cable car, the first reversible gondola system in Asia with duplex cabin, has achieved 2 Guinness World Records:

– Highest passenger capacity in a cable car cabin (230 passengers per cabin)

– Tallest cable car tower (188,88 meters)

18.30: Have dinner and stay overnight at Ha Long City.

After dinner, you will have time to visit night market.

Day 2: Ha Long City - Thai Nguyen

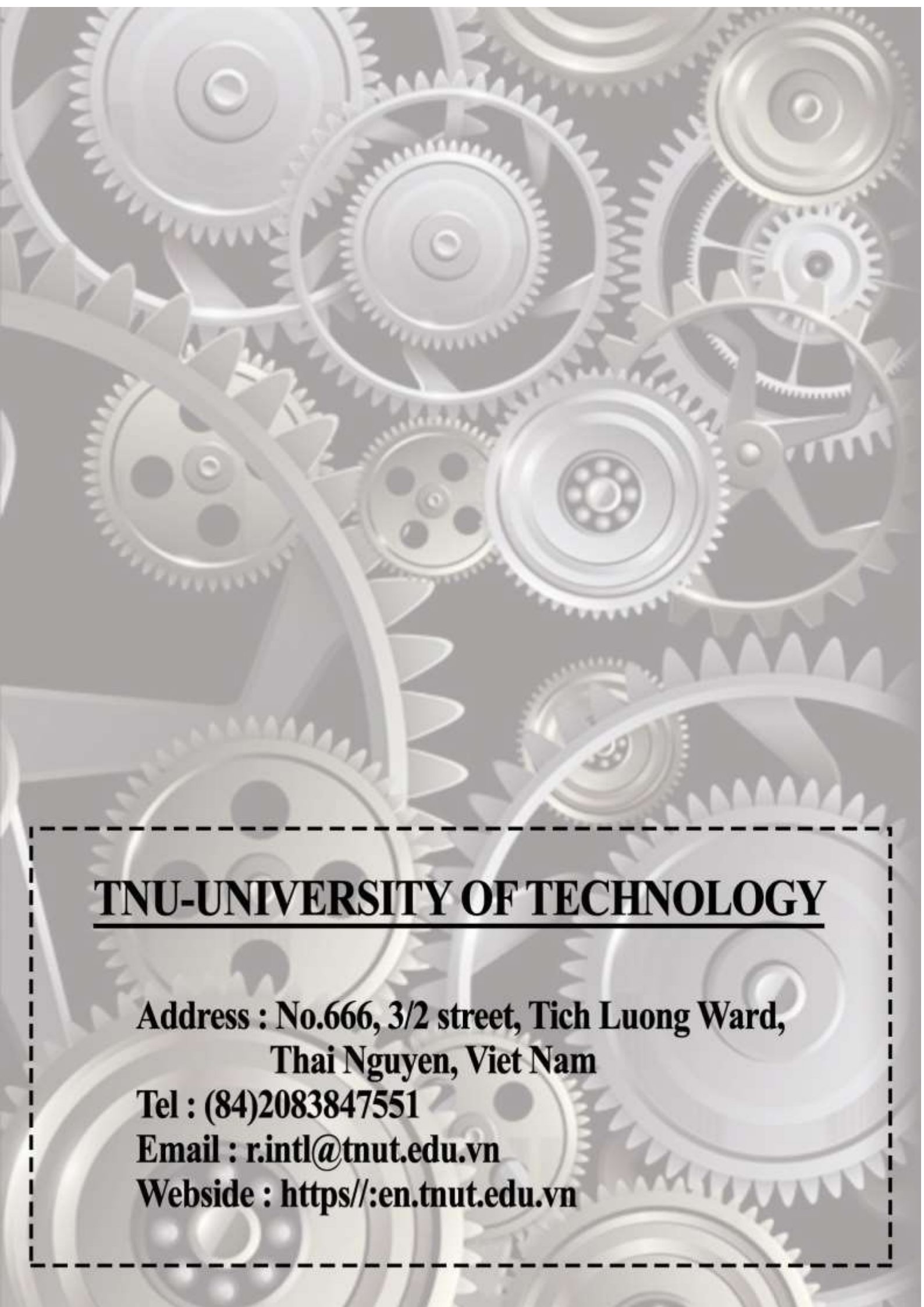
7.00: Breakfast serving time at your hotel.

7:30: Time for visiting the most beautiful place of Ha Long Bay through the unique islets with funny names such as Dog, fighting chickens…

11:00: You check out the room, have lunch in the restaurant then get ready for bus pick up at 12.30.

13:00: Departure for Thai Nguyen.

16:00: We arrive in Thai Nguyen and drop you off at Dong A II.



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