

■ CONFERENCE ABSTRACTS ■

Bali, Indonesia | 7th-9th September, 2019

DMEE 2019

**International Conference on Design, Mechanical and
Electrical Engineering**

ICPECE 2019

**International Conference on Power Electronics and
Control Engineering**



Alam KulKul Boutique Resort Kuta Bali

Jl. Pantai Kuta, Legian, Bali – Indonesia 80361

Web: <http://alamkulkul.com/>

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Daily Schedule

September 7, 2019 -- Meeting Room (1st Floor)

Ms. Tina T. Wong

**Registration
(10:00-17:00)**

*Collecting conference materials;
*Certificate will not be available at the registration desk until you finish the presentation at the conference day (except the listeners and poster presenters);
*Accommodation is not provided, and it's suggested to make an early reservation.

September 8, 2019 -- Meeting Room (1st Floor)

Morning

09:30-09:35 | Welcome & Opening

Prof. Dr. Mohd Hamdi Abdul Shukor, University of Malaya, Malaysia

09:35-10:20 | Keynote Speaker 1

Prof. Alvin Y. Chua, De La Salle University, Philippines


“Unmanned Aerial Vehicle Control and Applications”

10:20-11:00 | Group Photo & Coffee Break 

11:00-11:45 | Keynote Speaker 2

Prof. Dr. Mohd Hamdi Abdul Shukor, University of Malaya, Malaysia

“Engineering Development of Precision and Specialized Machines”

12:00-14:00 | Lunch at Restaurant 

Afternoon

Session 1 | 14:00-15:30

< Electronic Design Technology >

15:30-16:00 | Coffee Break & Poster Session 

Session 2 | 16:00-17:30

< Control and Design Engineering >

17:45-19:00 | Dinner 

September 9, 2019 -- Optional Visit (Excluded from Registration Fee)

Welcome Address

We are delighted to welcome you to DMEE 2019 & ICPECE 2019 conferences, which will be held at Bali, Indonesia from September 7th-9th, 2019.

We wish to express our sincere appreciation to all the individuals who have contributed to DMEE 2019 & ICPECE 2019 in various ways. Special thanks are extended to our colleagues in program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee who had dedicated their time and efforts in planning, promoting, organizing and helping the conference. Last but not least, our special thanks go to keynote speakers Prof. Dr. Mohd Hamdi Abdul Shukor, University of Malaya, Malaysia; Prof. Alvin Y. Chua, De La Salle University, Philippines; Prof. Ir. Dr. Ab Halim Bin Abu Bakar, University of Malaya, for all the kind and patient support and assistance they offered to our whole conference procedure. Without their support, our conference could not be prepared so smoothly, thanks again.

For parallel sessions, one best presentation will be selected from each session, evaluated from: Originality; Applicability; Technical Merit; PPT; English. The best one will be announced and awarded the certificate at the end of each Session.

Bali is in Southeast Asia, but sometimes this Indonesian island feels like another world. You can take a bus straight from the airport to your ultra-modern resort in Kuta and then cross vast expanses of rice fields to visit the art galleries at Ubud or the dizzying cliff-top heights of Pura Luhur Uluwatu.

In a Muslim-majority country, Bali is culturally Hindu, with traditions and festivities celebrated nowhere else in the region. The culture is best appreciated through the arts and food that the locals lovingly share with their visitors, but this culture sits in an uneasy truce with encroaching modernity in the form of resorts, golf courses, and malls sprouting up all over.

We wish you a enjoyable visit in Bali!

DMEE 2019 & ICPECE 2019
Conference Organizing Committee

Organizing Committee

CONFERENCE CHAIRS

Mohd Hamdi Abdul Shukor, University of Malaya, Malaysia

Ab Halim Bin Abu Bakar, University of Malaya, Malaysia

PROGRAM CHAIR

Alvin Y. Chua, De La Salle University, Philippines

PUBLICITY CHAIR

Thillainathan Logenthiran, University of Washington, USA

TECHNICAL COMMITTEE

Yasuo Kondo, Yamagata University, Japan

Satoshi Sakamoto, Yokohama National University, Japan

Tatsuya Yamazaki, Niigata University, Japan

Hiroyuki Yaguchi, Tohoku Gakuin University, Japan

Nicoleta GILLICH, "EftimieMurgu" University of Resita, Romania

Rosli Ahmad, Universiti Tun Hussein Onn Malaysia

Thelma D. Palaoag, University of the Cordilleras, Philippines

Megat Mohamad Hamdan bin Megat Ahmad, Universiti Pertahanan Nasional Malaysia

Svetlana Vasileva-Boyadzhieva, International College - Dobrich, Bulgaria

Sheila Abaya, University of East-Caloocan, Philippines

Surekha Kamath, MIT, India

Saikat Chakrabarti, Indian Institute of Technology, India

N. M. Renukappa, Sri Jayachamarajendra College of Engineering, India

Zain Anwar Ali, Nanjing University of Aeronautics and Astronautics, China

Anurag Sharma, Newcastle University Int'l Singapore

Jennifer L. Santos, Centro Escolar University, Philippines

Crystalynne D. Cortez, Centro Escolar University, Philippines

Local Information

Basic Information



Police emergency phone: 112

Emergency center: 118

Fire alarm: 113

Main attractions: Pura Tanah Lot, Mount Batur, Uluwatu Temple, Ubud Monkey Forest, Ubud Art & Culture, Tegallalang and Jatiluwih Rice Terraces in Bali, Waterbom Bali, Pura Ulun Danu Bratan, Kuta Beach, The Nusa Islands, etc.

Time

UTC/GMT+8

Weather

The Weather Situation of Bali in September

Average daily minimum temperature

23°C

Average daily highest temperature

29°C

Transportation

Bemo. This is a minibus or van with a row of low seats down each side that can carry about 12 people.

Bus. Every town in Bali has at least one terminal for all forms of public transit, including buses. There are often several terminals in larger towns.

Ojek. Around towns and along roads, you can always get a lift by ojek (a motorcycle).

Taxi. Metered taxis are common in the south of Bali and in Denpasar. They are essential for getting around, and you can usually flag one down in busy areas.

Private cars. There is an option of renting a car with a driver, but there are no set rates. Negotiation is the key.

Uber. Pull up your Uber app while in Bali and have your ride come to you. Prices are published right in the app.

Ferry. Travel between Bali, Lombok, the Gili Islands and Lembongan is available through Bali Ferry with frequent departures during the day.



Instructions for Oral & Poster Presentations

Oral Presentations

- **Timing:** a maximum of 15 minutes total, including speaking time and discussion. Please make sure your presentation is well timed. Please keep in mind that the program is full and that the speaker after you would like their allocated time available to them.
Please arrive at the designated conference room 15 minutes earlier, in case some authors are not able to make the presentation on time.
- You can use USB flash drive (memory stick) and make sure you scanned viruses in your own computer. Each speaker is required to meet her / his session chair in the corresponding session rooms 10 minutes before the session starts and copy the slide file (PPT or PDF) to the computer.
- It is suggested that you email a copy of your presentation to your personal inbox as a backup. If for some reason the files can't be accessed from your flash drive, you will be able to download them to the computer from your email.
- Please note that each session room will be equipped with a LCD projector, screen, point device, microphone, and a laptop with general presentation software such as Microsoft Power Point and Adobe Reader. Please make sure that your files are compatible and readable with our operation system by using commonly used fronts and symbols. If you plan to use your own computer, please try the connection and make sure it works before your presentation.
- Videos: If your Power Point files contain videos please make sure that they are well formatted and connected to the main files.

Poster Presentations

- Maximum poster size is 60 CM X 80 CM.
- Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart.
- Please note that during your poster session, the author should stay by your poster paper to explain and discuss your paper with visiting delegates.

Dress Code

- Please wear formal clothes or national characteristics of clothing.

Keynote Speakers



Prof. Dr. Mohd Hamdi Abdul Shukor, University of Malaya

Biography: M. Hamdi is a senior professor in the Department of Mechanical Engineering, University of Malaya. He received his B.Eng. (Mechanical), from Imperial College, London and his M.Sc. In Advanced Manufacturing Technology & System Management from University of Manchester Institute of Science & Technology (UMIST). His Doctoral study was in the field of thin film coating for biomedical applications for which he was conferred Dr. Eng by Kyoto University. He is a Fellow of the Institution of Mechanical Engineering, UK and a Chartered Engineer (C.Eng) with the UK Engineering Council. Professor Dr M. Hamdi has devoted his career in nurturing research and innovation and has mentored over 125 postgraduate students, particularly in the field of advanced machining, materials processing and surface engineering. He has authored more than 145 ISI journals and having a h-index of 20. He is also a director and founder of the Centre of Advanced Manufacturing & Materials Processing (AMMP Centre), in which has grown from modest-size team of researchers and engineers to an interdisciplinary research hub. Professor Dr M. Hamdi has obtained recognition from various international and local organizations.

Engineering development of precision and specialized machines

The challenge of commercial deployment of research output is a very real and daunting issue faced by most academicians. The strategy to commercialize prototypes should start with preserving the “crown jewels” -- the technology that is the basic premise of the innovation or the essence of what has been proven. Without changing the proven functionality, the parts surrounding the core technology and supporting systems would be designed or redesigned for the best manufacturability, cost, quality, and time-to-market while being integrated into an optimal product architecture.

The Centre of Advanced Manufacturing and Material Processing (AMMP Centre), University Malaya has been involved in numerous commercialization of research outputs and industry related projects from its inception in 2002. Several successful projects is presented as case studies to show its engineering development phases from concept ideas, lab prototypes, industrial redesign, commercial packaging and testing, scale up production and final sale and support services.

The talk will present the developmental journeys of these projects, highlighting the various stages in the process, such as in design conceptualization, prototyping, testing and commercial packaging. The products highlighted are, a modular CNC lathe machine designed for the educational and SME sectors, a specialized apparatus for the thermal testing of dental materials, an MQL system for nano-lubrication during metal cutting and a powder PVD, a novel apparatus for the deposition of thin films from elemental powders.



Prof. Alvin Y. Chua, De La Salle University, Philippines

Biography: Dr. Alvin Y. Chua is a Professor and the Chairman of the Mechanical Engineering Department of De La Salle University. He earned his BSME, MSME, and Ph.D. in ME at De La Salle University-Manila. As a scholar under the Department of Science and Technology-Engineering and Science Education Project (DOST-ESEP), he conducted his dissertation research at the University of New South Wales, Australia. He received a special citation for the 2003 NAST-DuPont Talent Search for Young Scientists (Mechanical Engineering). He was also awarded the 2015 Outstanding Student Adviser of the American Society of Mechanical Engineers (ASME). He has published in several journal publications and international conferences like Conference on Decision and Control (CDC), and Advance Intelligent Mechatronics (AIM).

His current research interests are on Mechatronics, and UAV systems. In his Mechatronics research, he was able to work on researches that improved the intelligence of articulated and mobile robot systems. He was also able to apply Mechatronics to improve the energy generation of renewable energy systems. In his UAV systems research, he dealt with control techniques (e.g. Fuzzy Logic, Kalman Filters) for rotorcrafts (e.g. quadcopter, octocopter) and blimps for improved mobility. Currently, he is working on applying UAV technologies to disaster management and inspection applications. He also received a government grant under DOST-PCIEERD entitled "Development of a Flight Controller for a Modular UAV"

Unmanned Aerial Vehicle Control and Applications

The technology developments for Unmanned Aerial Vehicles (UAV) are growing leaps and bounds moving towards its integration to the different areas of our lives. One of the main limitations of UAVs is the flight controller since the computation needed to maintain stable flight is already burdensome to the processor. The introduction of other sensors and tasks to the drone is limited due to its processing capability. A way to mitigate this situation is the inclusion of a companion computer to the control system of the drone. This will expand the processing power of the drone to fulfill other tasks. Sample implementations with the companion computer show its advantage and expanded applications. As the Philippines is moving towards economic development, different sectors are interested in the UAV area and envisioned that the country would be a leader in UAV technology in the future. Finally, the future directions of UAV technology are explained towards the development of appropriate technologies in different scenarios including swarm systems.

Afternoon, September 8th, 2019

Session 1—14:00-15:30

< Electronic Design Technology >

Session Chair: Prof. Alvin Y. Chua, De La Salle University, Philippines

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- * Session Photo will be taken at the end of the session.

| | |
|---------------|--|
| E004-A | SPH computation for soil surface explosion problem -the effect of different soil characteristics on a fragment behavior |
| E011 | Design and Analysis on Performance of Chiller Barrel |
| E020 | Characteristics Symmetric Hybrid Worn Slot-Entry Journal Bearing under Turbulent Regime |
| E0004 | Novel HRS-Based Porous Core Photonic Crystal Fibre for Terahertz Wave Guidance |
| E0005 | Octagonal Photonic Crystal Fibre with Golden Ratio Principle as a Dispersion Compensating Fibre |
| E0008 | Development of a Novel Emergency Lighting System with Improved Boost-Flyback Topology |



E004-A

Time: 14:00-14:15

SPH computation for Soil Surface Explosion Problem -the Effect of Different Soil Characteristics on A Fragment Behavior

Prof. Yoshikazu HIGA, Hirofumi IYAMA, Ken SHIMOJIMA, Osamu HIGA and Shigeru ITOH

Nat. Inst. Tech. (KOSEN), Okinawa College, Japan

The goal of our research is to contribute to a technique of unexploded bomb (UXB) disposal such as an establishment of evacuation areas based on the computational mechanics. To elucidate the fragments behavior such as shells, explosives and Okinawan's unique soils, the computational model based on the SPH (Smoothed Particle Hydrodynamics) schemes have been constructed with HyperWorks-RADIOSS (®Altair) software and have performed the computation. From a series of computational results, we have confirmed and clarified the fragment behavior significantly dependent on the amount of explosive charge and the dynamic characteristics of soils.



E011

Time: 14:15-14:30

Design and Analysis on Performance of Chiller Barrel

Mr. Choy Hau Yan, Ang Ruo Fan

Tunku Abdul Rahman University College, Malaysia

Abstract: Chiller barrel is considered as a shell-and-tube heat exchanger and generally applied in a water-cooled chiller. It is important to improve the performance of a chiller barrel so that the usage of electrical energy can be reduced while the quality of a product can be increased. In this project, the performance of a chiller barrel will be simulated and designing of chiller barrel being done based on the size of the baffle to improve the performance. Besides that, the flow characteristics of the fluid in the chiller barrel will be analyzed and compared by using a CFD simulation tool. Outlet temperature and pressure will be simulated while the rate of heat transfer, logarithmic mean temperature difference and overall heat transfer coefficient will be calculated. All value will be analyzed and selection the most optimum design which is the baffle with 30% of cut percentage based on the consideration of overall heat transfer coefficient and pressure gradient.

E020

Time: 14:30-14:45

Characteristics of Symmetric Hybrid Worn Slot-Entry Journal Bearing under Turbulent Regime

Assoc. Prof. Nathi Ram, Saurabh Kumar Yadav

Indira Gandhi Delhi Technical University For Women, India

In the present work, computations of performance of symmetric hybrid worn slot-entry journal bearing under turbulent lubrication have been investigated. The model of abrasive wear given by Dufrane has been used to determine the wear on the surface of bearing because of starting and stopping operations. For wear and turbulent lubrication, the Reynolds equation has been modified using Constantinescu turbulent model. This modified equation has been solved by applying the finite element method. The effects of wear and turbulent lubrication on the characteristics of bearing have been evaluated for different Reynolds number and wear depth parameter. Minimum thickness of the fluid film and damping coefficients are more for the unworn bearing having slot width ratio (SWR) of 0.25 than the bearing with SWR of 0.5 and 0.75 operates at a constant value of Reynolds number but these values reduce for bearings as wear depth parameter increases. Further, it is also observed that as wear depth parameter value increases, stability threshold speed gets reduced for bearing operates at slot width ratio 0.25, 0.5 and 0.75 for constant Reynolds number.

E0004

Time: 14:45-15:00

Novel HRS-Based Porous Core Photonic Crystal Fibre for Terahertz Wave Guidance

Izaddeen Yakasai, **Assist. Prof. Pg Emeroylariffion Abas**, Feroza Begum, Shubi Kaijage

Universiti Brunei Darussalam, Brunei Darussalam

A novel porous core photonic crystal fibre (PC-PCF) with high birefringence and extremely low transmission loss is proposed and investigated. High birefringence is achieved by using High Resistivity Float Zone Silicon as background dielectric material. Simulation results demonstrate that the proposed PC-PCF has a birefringence above 0.9, effective material loss (EML) of 0.012 cm⁻¹ and 0.0038 cm⁻¹ and confinement losses in the order

of 10⁻¹⁹ and 10⁻⁷ for X- and Y- orthogonal fundamental modes, respectively, at frequency 1.3 THz. It is shown that whilst maintaining its high birefringence, the X-polarisation mode shows low total losses in a wider frequency range than the Y-polarisation mode. Moreover, variation of the core power fraction and effective modal area with frequency is carefully studied. The proposed PC-PCF comprises of simple geometry in both core and cladding and thus can be easily fabricated using existing fabrication technologies. Its high birefringence makes it potentially suitable for integration in applications such as terahertz medical imaging, terahertz filtering, terahertz interferometry, and sensing.

E0005

Time: 15:00-15:15

Octagonal Photonic Crystal Fibre with Golden Ratio Principle as a Dispersion Compensating

Fatin Nadhirah, Izaddeen Yakasai, **Assist. Prof. Pg Emeroylariffion Abas**, Saifullah Abu Bakar, and Feroza Begum
Universiti Brunei Darussalam, Brunei Darussalam

An octagonal 5- layer air-hole dispersion compensating photonic crystal fibre is presented in this paper. The design is based on the golden ratio principle where the pitch to air hole diameter ratio is kept at 1.618. Numerical analysis using full-vector finite element method (FEM) with a perfectly matched layer boundary condition is used to investigate optical properties of the PCF. At its optimum pitch value, high negative dispersion of - 295 ps/(nm.km) and low confinement loss of 0.00755 dB/km is achieved at 1550 nm wavelength. Similarly, the proposed PCF also yields negative dispersion and low confinement loss on the E+S+C+L+U wavelength bands and partially on the O band with optimum pitch. These properties point to the suitability of the proposed PCF for potential application as a dispersion compensating fibre.

E0008

Time: 15:15-15:30

Development of a Novel Emergency Lighting System with Improved Boost-Flyback Topology

Prof. Yu-En Wu

National Kaohsiung University of Science and Technology, Taiwan

This paper proposes a novel emergency lighting device (ELD), it can be used as an auxiliary lighting equipment to improve the utilization rate of equipment. Two kinds of topologies are used in ELD to achieve the functions of charging the battery and lighting. The battery charging topology uses a two-switch forward, with three-stage charging control to charge the battery when the AC is normal; the lighting circuit uses an improved boost-flyback converter. The output of the lighting circuit will be connected to the Relay. When the external power is stopped or the signal is turned on, the LED light is illuminated. The ELD first tests the functional stability through the burning machine, and then goes to the actual field for three months to test the overall stability of the circuit. The maximum efficiency of battery charging circuit reaches above 95% at a 75% load condition and the maximum efficiency of LED lighting circuit reaches above 98% at a 75% load condition.



Session 2—16:00-17:30

< Control and Design Engineering >

Session Chair: Assoc. Prof. Takashi Takuma, Osaka Institute of Technology, Japan

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| | |
|--------|--|
| E005-A | Development of A Pressure Vessel for Food Processing Machine Using Underwater Shock Wave Realizing Highly Efficient Processing Effect |
| E022 | Enterprise Resource Planning Open Source Design to Estimate Maintenance Time of Production Machine at Medium Plastic Industry |
| E006 | Efficiency and Loss Analysis of Proposed BLDC Motor Drive and Existing Universal Motor Drive Used in a Mixer Grinder |
| E009 | Semi-Monocoque Wing Structure with 3D Printed PLA Filament Wing Spar. |
| E027 | Design of Tendon-driven Mechanism by using Geometrical Condition |
| E002 | Experimental Validation of the KC Autotuner on a Highly Nonlinear Vertical Take-Off and Landing (VTOL) Process |



E005-A

Time: 16:00-16:15

Development of A Pressure Vessel for Food Processing Machine Using Underwater Shock Wave Realizing Highly Efficient Processing Effect

Assoc. Prof. Ken Shimojima, Osamu Higa, Yoshikazu Higa, Ayumi Takemoto, Hideaoki Kawai, Kazuyuki Hokamoto and Shigeru Itoh
National Institute of Technology, Okinawa College, Japan

Okinawa National College of Technology has developed a food processing machine using underwater shock waves. We developed several prototypes machine, and obtained experimental results (sterilization, improvement of juice extraction, milling flour, emulsification etc.) .This device consists of a power supply unit and a processing unit. The electric energy charged in the condenser of the power supply unit is instantaneously energized with the aluminum thin wire inside the pressure vessel by the gap switch. Shock waves are generated by thermite reaction. The food is enclosed in a container of resin and crushed in the air. The processing mechanism by the shock wave is a sparring phenomenon, which is different from the conventional processing machine. The developed processing equipment is setup in the laboratory, and the processing object is brought into the laboratory and processed. It is difficult to processing on outfield with current processing machine. The continuous processing equipment developed is a device for processing one type of processing object. It is difficult to process many objects without mixing. In order to solve the above problems, we developed a pressure vessel in processing equipment using shock waves. The developed pressure vessel is shown below.

- Mobile type pressure vessel that can be transported by hand in order to realize processing in outfield.
- Continuous processing equipment capable of supplying individual containers.

The design and manufacturing of a prototype pressure vessel is presented. In this presentation, the design and fabrication of the pressure vessel prototyped is shown. The shock wave is observed by a high-speed camera, and the propagate pressure of the shock wave to the processing target concerned with the processing performance is estimated. The food is processed experimentally by the prototype pressure vessel, and the processing performance is evaluated.



E022

Time: 16:15-16:30

Enterprise Resource Planning Open Source Design to Estimate Maintenance Time of Production Machine at Medium Plastic Industry

Mr. Muhammad Akha Dewantoro, Henky Suskito Nugroho
Universitas Indonesia

Abstract: Internet involvement in world industries development as activities integration media motivate Medium Industries of Indonesia to compete with Big Industries local and international. Medium Plastic Industries of Indonesia which experienced increasing demand become opportunities in developing integration by applying ERP Open Source to integrate activities in industries. The tested mobility aspect had shown that ERP can be accessed inside referral company scope in stable time with CV under 10%. Machine maintenance which support production activities cannot be done perfectly and gives high cost also long downtime. By creating ERP Open Source with maintenance module, failure prevention can be estimated by Weibull Distribution on production machine component failures. ERP estimation resulted very small error approximately 4% rather than analytical calculation for MTTF value and calculated perfectly for PDF and failure probability value. This estimation gave downtime and loss cost reduction more than 20% for the referral industry.



E006

Time: 16:30-16:45

Efficiency and Loss Analysis of Proposed BLDC Motor Drive and Existing Universal Motor Drive Used in a Mixer Grinder

Ms. Deekshitha S Nayak, Dr R Shivarudra Swamy
Manipal Academy of Higher Education, India

In the commercially available mixer grinders, for controlling the speed of the universal motor, triac is used. The triac-based universal motor has lesser efficiency, so the voltage source inverter (VSI)-based brushless DC (BLDC) motor can be used in the application of mixer grinders. In the proposed VSI-based BLDC motor, the current and voltage sensors were eliminated. By adjusting the DC bus voltage of the VSI, the speed of the BLDC motor is controlled. The Triac-based 230V universal motor and the proposed VSI-based 48V BLDC motor was simulated by the

Matlab/Simulink. The efficiency and loss of the Triac-based universal motor and the proposed VSI-based BLDC motor for mixer grinder is compared in this paper.



E009

Time: 16:45-17:00

UAV Wing Structure with 3D Printed PLA Filament Wing Spar

Mr. Mohammad Alif Maarif Mabbrur, Hafidz El Amien Noor Pamungkas,
Novia Sari Syaifer, Arif Hidayat, Arif Hidayat
Institut Teknologi Bandung, Indonesia

Polylactic Acid (PLA) filament is one of the organic polymers that commonly wide-used in making a model by using a 3D Print method. This material can be applied on the UAV wing structure, by using semi-monocoque structure concept. The sizes of the wing structure components are determined by the forces acting on the wing itself, and derived into shear and bending moment stresses, so it created an optimum semi-monocoque structure to carry the load. This paper discusses the use of 3D printed PLA filaments for spars on the acrobatic UAV in order to optimize vehicle weight.

E027

Time: 17:00-17:15

Design of Tendon-driven Mechanism by using Geometrical Condition

Assoc. Prof. Takashi Takuma, Fumiya Kitaura
Osaka Institute of Technology, Japan

A tendon-driven robot has an advantage of setting mass distribution and facilitation of the motion and so on. This paper explains a procedure of designing the tendon-driven robot using single actuator. The joint torque is generated by the single actuator and wire that passes through the pulleys attached on the links. In order to setting pulley position, a geometrical condition to realize the desired motion is adopted. For evaluation of the proposed method, a physical monopod robot is developed for vertical jumping. We compared calculated and physical force on the contacting point of the robot, and observed the jumping motion.

E0002

Time: 17:15-17:30

Experimental Validation of the KC Autotuner on a Highly Nonlinear Vertical Take-Off and Landing (VTOL) Process

Robin De Keyser, **Isabela R. Birs** and Cristina I. Muresan
Technical University of Cluj-Napoca, Cluj-Napoca, Romania

The paper focuses on a novel PID autotuner based on a single experimental sine test. The KC autotuner design and validation are targeted on a Vertical Take-Off and Landing platform which exhibits a highly oscillatory non-linear motion with time delay. An additional autotuner fit for time delay processes such as the well-known Ziegler-Nichols method is used to determine a PID (Proportional Integral Derivative) controller for the VTOL process. The experimental results obtained with the two different experimental tuning methods under several operating conditions are compared, illustrating the superiority of the KC autotuner.

Posters



E029

Measurement for Rice Leaves Morphological Formation and Structural Information Using a Non-invasive Tomography

Ms. Hyreer Kim, Ruchire Eranga Wijesinghe, Mansik Jeon and Jeehyun Kim

Kyungpook National University, Korea

Using non-invasive tomography demonstrated against biological system structures involved in rolling the leaves critical of rice leaves. Rice is one of the most important crops in the world. However, rice yields are now decreasing due to unexpected changes in climate and the occurrence of mutations. Many research groups have studied this situation and important biological system structures such as bulliform cells, aerenchyma cells, and vascular bundle are involved in the rolling of rice leaves. We have noninvasively identified the structures of these rice leaves using a swept source optical coherence tomography (SS-OCT). Furthermore, the number of small veins involved in the rolling of the leaves and the three angles based on the mid-vein quantified through acquiring tomography images. In this paper, we propose the possibility of optical coherence tomography as a biological diagnostic method for future agriculture.

E002-A

A new type of magnetic actuator combining electromagnetic vibration and magnetic wheel

Prof. Hiroyuki Yaguchi

Tohoku Gakuin University, Japan

In the present study, a prototype of a rotary actuator system combining two iron disks and two electromagnetic-vibration-type actuators was fabricated. A new operation principle was developed that drives the system using the reaction force of the vibration-type actuator. The operating principle of the vibration type actuator proposed by the authors was newly expanded. In this actuator, two electromagnetic-vibration type actuators are held by an E-shaped acrylic material, and rotate two iron disks by using the reaction

force of the vibration type actuator. Details of design and operation principle will be shown in presentation. This rotary movement actuator is composed of the two vibration components, two shape-memory-alloy (SMA) coils, two iron disks, electromagnet and E-shaped acrylic frame. By passing an electric current through the electromagnet, a magnetic path is formed between the iron structure and the two magnetic wheels. The rotary movement actuator is 40 mm in length, 40 mm in height, 40 mm in width, and the total mass is 65 g. This magnetic-wheel-type actuator system is able to climb upward at a speed of 24 mm/s while pulling a load mass of 120 g when the attractive force of the rubber magnet is 1.78 N.

E003-A

Influence of Frictional force on Movement Characteristics of Vibration Type Actuator

Prof. Hiroyuki Yaguchi

Tohoku Gakuin University, Japan

In the present study, the vibration actuator with a very simple structure capable of movement on a magnetic substance by means of the inertial force was considered. Furthermore, upsizing for the actuator in order to improve the propulsion characteristics was considered. The volume of the permanent magnet constituting the vibration component of the actuator was increased according to the similarity rule. The actuator with the volume of the permanent magnet used in the previous study proposed by the author was used as a standard model, and the actuator with permanent magnet volume of 2 times, 3 times and 5 times for the standard model is trial manufactured, respectively. The experimental results demonstrate that the maximum efficiency of the actuator for the standard model pulling its own weight was 27.1 %. Furthermore, the actuator is able to pull a load mass of 170 g. For the actuator of 2 times model, this actuator is able to climb upward at 9.1 mm/s while pulling a load mass of 850 g when input power was 1.4 W. For 5 times model, the actuator is able to climb upward at 9.5 mm/s while pulling a load mass of 3500 g.



E030

In-Vivo Quantitative Depth Measurement of the Human Gingival Sulcus Based on Interferometry System with Detection Algorithm

Mr. Hoseong Cho, Jaeyul Lee, Jaewon Song, Mansik Jeon, and Jeehyun Kim

Kyungpook National University, Korea

Optical coherence tomography (OCT) has magnetized substantial notice in biomedical optical imaging since it can reveal the inner structures. Gingival is a soft tissue that surrounds a tooth. In dentistry, the depth of the gingival sulcus reveals clinical diagnostic criteria for periodontal tissue status. We propose an algorithm for measuring the gingival sulcus in the OCT 2D cross-sectional images and verified the algorithm using OCT systems with three different wavelength bands. Periodontal tissues of six healthy individuals, among them maxillary and mandibular incisors and posteriors, were taken. We have obtained a clear comparison of quantitative and qualitative measurements, and to evaluate gingival sulcus non-destructively. Additionally, commercial Sobel and Canny operators primarily used, were compared with the proposed algorithm to confirm reducing sensitivity to noise and speckle in OCT images.

E007

A study on Cyber-physical system architecture to predict cutting tool condition in machining

Prof. Yasuo KONDO, Mitsugu YAMAGUCHI, Satoshi SAKAMOTO, Kenji YAMAGUCHI

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This article illustrates a systematic approach for predicting tool wear in machining process through Cyber-Physical System (CPS) architecture using simple electronic components such as personal computers and low-cost sensors. The proposed Cyber-Physical structure consists of 5 steps; smart connection, data to information, feature extraction, awareness of issues and self-adjustment. We tried to install a big data analysis technology into CPS architecture to catch the usual/unusual state of the cutting tool from the spindle power consumption changes. The excessive repetitions of grooving would bring the trend changing of power consumption. To facilitate the statistical analysis, the correlation coefficient

R was calculated from the single regression analysis between two different cycles of time-series power consumption. The correlation coefficient R also had a strong relation with the condition changes of tool wear and would become a powerful tool to catch the usual/unusual state of the cutting tool in the proposed CPS architecture. The health information obtained from the system can be used for higher level of management of cutting tool based on the condition monitoring free from the schedule-based maintenance.

E0010

Development of Methodology and Engineering Model for Generation Expansion Planning Considering Environmental Policy and Energy Storage System

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Korea has expanded the supply of the energy storage system (ESS) after the establishment of K-ESS 2020, but the criteria for adequate install capacity are insufficient. In addition, WASP is used when establishing generation expansion planning, but there are difficulties in reflecting environmental and new facility supply policies. In this paper, a generation expansion planning model considering environmental policy and ESS facility characteristics is proposed, and the change of the generation expansion plan according to the reflection of various policies is examined by conducting case studies.



E008

Sliced Surface Generation Mechanism of Unidirectional Glass Fiber-Reinforced Plastic by Multi-Wire Sawing

Prof. Satoshi Sakamoto, Tomohito Fujioka, Liu Jiayu, Mitsugu Yamaguchi, Yasuo Kondo, and Kenji Yamaguchi

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Anisotropic materials represented by fiber-reinforced plastic (FRP) are widely used in various fields because of their high specific strength. However, the cutting resistance greatly fluctuates because anisotropic

materials have strength anisotropy. Therefore, the field of cutting has been studied for a long time now. Meanwhile, several research reports on abrasive grain processing have been presented, but many unknown points exist at present. In this study, we investigated the generation mechanism of the sliced surface when slicing an anisotropic material using an electrodeposited diamond wire tool. Unidirectional glass fiber-reinforced plastic (GFRP) was used as the work material. Consequently, it was found that the slicing rate does not depend on the slicing angle or slicing area. The accuracy of the sliced surface roughness and the wafer thickness degraded as the slicing angle increased. The generation mechanism of the sliced surface differs depending on the slicing system. In other words, in the free abrasive grain system, it becomes the generation mechanism of the sliced surface mainly by microfractures. In contrast, in the fixed abrasive grain system, the generation mechanism of the sliced surface is mainly by microcutting in the ductility mode.

September 9th, 2019

One day Visit Bali, Indonesia

Lembongan Island & Nusa Penida

- 07:00 ● Pick you up at hotel lobby
- 08:00 ● Take boat to Lembongan Island
- 08:45 ● Looking around the island by sightseeing bus
- 11:30 ● Lunch time (Buffet)
- 12:30 ● Nusa Penida
- 16:30 ● Go back by boat



Note:

- 70 USD/person including lunch.
- According to rule of Indonesia Government, you will be charged 25000 IDR cash as Environmental maintenance fee.
- Insurance (please provide valid ID information)



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