

FRONT PAGE

CRC 2018

The 3rd International Conference on
Control, Robotics and Cybernetics

ICIMA 2018

The 2nd International Conference on
Intelligent Manufacturing and Automation Engineering

Penang, Malaysia | December 18-20, 2018

Published by



Hosted by



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AGENDA

[December 18, 2018]



10:00-17:00
Registration & Materials Collection



Eureka Lobby



Eureka Building, Universiti Sains Malaysia, Penang



Give your **Paper ID** to the staff.



Sign your name in the attendance list and check the paper information.



Check your **conference kit**, which includes conference bag, name tag, lunch & dinner coupon, conference program, the receipt of the payment, the USB of paper collection and a pen.



14:00-15:30 | Campus Visit
Universiti Sains Malaysia, Penang

* If you are interested, please give your feedback before **November 28**. If you miss this date, we can't accept your request anymore.

* Please arrive at the **Eureka Lobby 10 minutes earlier**.



Universiti Sains Malaysia, Penang

AGENDA

[December 19, 2018]

MORNING



Opening & Keynote Speeches



Eureka Building, Universiti Sains Malaysia, Penang



Auditorium 2

Chaired by Prof. Ir. Dr. Mohd Zulkifly bin Abdullah Universiti Sains Malaysia, Malaysia		
09:00-09:10	Opening Remarks	Prof. Ir. Dr. Mohd Zulkifly bin Abdullah Universiti Sains Malaysia, Malaysia
09:10-09:50	Keynote Speech	Prof. LI Youfu City University of Hong Kong, Hong Kong Speech Title: Visual sensing and tracking in 3D for robotic applications--Modeling and calibration
09:50-10:30	 Coffee Break & Group Photo 	
	Poster Display P1-0004, P1-1005, P1-1006	
10:30-11:10	Keynote Speech	Dato' Prof Dr. Ir. Alias Mohd Noor Universiti Teknologi Malaysia, Malaysia Speech Title: How 3D Printing Is Changing Automotive Manufacturing
11:10-11:50	Keynote Speech	Prof. Jieh-Shian Young National Changhua University of Education, Taiwan Speech Title: Pedagogy of on-Vehicle Network System – CAN Bus











Lunch @ TBA | <12:00-13:30>

AGENDA

[December 19, 2018]

AFTERNOON

Authors' Presentations

 Auditorium 2	
13:30-15:00 	Session I - Quality Control and Industrial Production Chaired by TBA <hr/> 6 Presentations —P2-008, P2-006, P2-016, P2-018, P2-012, P2-3005
15:15-15:30	 Coffee Break
15:30-17:30 	Session III - Robot Control and Biomedical Engineering Chaired by TBA <hr/> 8 Presentations —P1-0008, P1-0019, P1-1008, P2-007, P1-0001, P1-0014, P1-0016, P1-1009
 Auditorium 3	
13:30-15:15 	Session II –Aviation and Mechanical Engineering Chaired by TBA <hr/> 7 Presentations —P1-0009, P1-0015, P1-1011, P2-3003, P2-019, P2-4001, P2-5004
15:15-15:30	 Coffee Break
15:30-17:30 	Session IV - Computer Aided Computing and Information Technology Chaired by TBA <hr/> 8 Presentations —P1-0002, P2-5003, P2-3004, P1-0003, P1-0005, P1-0006, P1-0017, P1-1003



Dinner @ TBA | <17:30-20:00>

AGENDA

Social & Visit Program

[December 20, 2018]

Penang City & Temple Tour with Penang Hill



Penang Hill



George Town



Kek Lok Si Temple

Departure Point: Eureka Building, Universiti Sains Malaysia, Penang

Departure Time: 9.20 AM | Duration: 5h

Highlights

- ♦ Discover the rich multicultural diversity of Penang
- ♦ Ride the funicular to the 2,733-foot (833-meter) summit of Penang Hill
- ♦ Explore George Town, Kek Lok Si Temple, and more
- ♦ Take it easy with door-to-door round-trip transfers

Inclusions

- ♦ English speaking Driver
- ♦ Penang Hill Train Ticket
- ♦ Temples visit fee (Kek Lok Si, Inclined lift)

Exclusions

- ♦ Food and Drinks Unless Specified
- ♦ Gratuities (Optional)

* If you are interested, please give your feedback **before November 28**. If you miss this date, we can't accept your request anymore.

WELCOME

Dear professors and distinguished delegates,

Welcome to the 3rd International Conference on Control, Robotics and Cybernetics (CRC 2018) & the 2nd International Conference on Intelligent Manufacturing and Automation Engineering (ICIMA 2018) held in Universiti Sains Malaysia, Penang, Malaysia on December 18-20, 2018.

This conference aims to provide a dynamic forum to address, explore, and exchange information, knowledge, and experiences in the areas of “Control, Robotics and Cybernetics” and “Intelligent Manufacturing and Automation Engineering”.

The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in the related field. As a result of their hard work, we are pleased to have accepted 32 presentations from 13 countries and regions including Germany, South Korea, Malaysia, Taiwan, India, Thailand, Kazakhstan, China, Peru, Viet Nam, Hong Kong, Czech Republic and Egypt.

We would like to acknowledge our three outstanding Keynote Speakers. They are Prof. LI Youfu, from City University of Hong Kong, Hong Kong; Dato' Prof Dr. Ir. Alias Mohd Noor from Universiti Teknologi Malaysia, Malaysia; Prof. Jieh-Shian Young from National Changhua University of Education, Taiwan. Apart from the keynote speeches, the conference is set up with 4 parallel Sessions. Participants will make presentations and discussions over 4 topics, i.e. Quality Control and Industrial Production; Aviation and Mechanical Engineering; Robot Control and Biomedical Engineering; Computer Aided Computing and Information Technology.

We would also like to express gratitude to our host Universiti Sains Malaysia, Penang, for the wonderful arrangements, support, and services they have provided, which made this conference a success. Universiti Sains Malaysia is one of the oldest institutes of higher learning (IHL) in Northern Malaysia. The campus visit in the afternoon of December 18 will let you know more about it.

We believe that by this conference, you can get more opportunity for further communication with researchers and practitioners with the common interest. Your suggestions are warmly welcomed for the further development of the conferences in the future. Wish you have a fruitful and memorable experience in Malaysia. We look forward to meeting you next time.

Yours sincerely,

Conference Organizing Committee

VENUE

Eureka Complex, Universiti Sains Malaysia, Penang, Malaysia

Add: Jalan Sungai 2, 11700 Gelugor, Pulau Pinang



TIPS

How to get **Eureka Complex** from **Airport** ?

➤ **The fastest way:**

 **Taxi**-----Around 20 minutes

➤ **The cheapest way:**

 **Bus**+  **Walking**----- Around 3 hours

Penang International Airport, Jalan Sultan Azlan Shah



102 **Teluk Bahang** (13 Stations)



Opps Kompleks Sunny Point




Walking to **Eureka complex**


Penang Guide

 **Weather**

Penang enjoys a warm equatorial climate. Average temperatures range between 29°C - 35 during the day and 26°C - 29°C during the night.

 **Time Zone**

GMT +08:00

 **Currency**

Malaysian Ringgit

 **Important Phone Numbers**

- Tourist Police	+604 261 2211
- Customs	+604 262 2300
- Civil Defence	991
- Fire	994
- Directory Enquiries	103
- Emergency Call From Mobile Phone	112

TIPS



Tips for Participants

- ✧ Your punctual arrival and active involvement in each session will be highly appreciated.
- ✧ The listeners are welcome to register at any working time during the conference.
- ✧ Get your presentation PPT or PDF files prepared.
- ✧ Regular oral presentation: 15 minutes (including Q&A).
- ✧ Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided by the conference organizer.
- ✧ Please keep all your belongings (laptop and camera etc.) with you in the public places, buses, metro.

SPEAKERS



Prof. Li Youfu,
City University of Hong Kong, Hong Kong

You-Fu Li received the PhD degree in robotics from the Department of Engineering Science, University of Oxford in 1993. From 1993 to 1995 he was a research staff in the Department of Computer Science at the University of Wales, Aberystwyth, UK. He joined City University of Hong Kong in 1995 and is currently professor in the Department of Mechanical Engineering. His research interests include robot sensing, robot vision, and visual tracking. In these areas, he has published over 300 paper including over 150 SCI listed journal papers. He has served as an Associate Editor for IEEE Transactions on Automation Science and Engineering (T-ASE), Associate Editor and Guest Editor for IEEE Robotics and Automation Magazine (RAM), and Editor for CEB, IEEE International Conference on Robotics and Automation (ICRA).

Title--- Visual sensing and tracking in 3D for robotic applications--Modeling and calibration

Abstract--- 3D vision is needed in many engineering applications including robotics. In this talk, I will present our research in visual sensing for automated 3D measurements in general and for motion tracking for robotics in particular. Different approaches in our investigation in 3D vision will be reported. These include an active vision approach to 3D visual sensing. For robotic applications, visual sensing in 3D is often needed, but the calibration remains tedious and inflexible with traditional approach. To this end, we have investigated the relevant issues for different visual sensing systems. A flexible calibration method desires the vision system parameters to be recalibrated automatically or with less operator interference whenever the configuration of the system is changed, but practically this is often hard to achieve. Various attempts were made in our previous works to enhance the flexibility in the visual sensing calibration. I will present some them including the work on omni-directional visual sensing and tracking. Another case to present is that of gaze tracking where the issues in the modeling and calibration are addressed with our new calibration method developed.

SPEAKERS



Dato' Prof Dr. Ir. Alias Mohd Noor

Universiti Teknologi Malaysia, Malaysia

Alias Mohd Noor Obtained his PhD in Mechanical Engineering in the field of Turbomachinery from University of Bath, England, UK in 1990, and experienced as academician since 1980.

Dr. Alias Mohd Noor is a Professor in Mechanical Engineering with specialization in Turbo-Machinery, Hydraulic Machinery, Fluid Mechanics, Internal Combustion Engines, Heat Transfer and Gas Dynamics. He has vast experience in academic administration. He used to be Dean, Faculty of Mechanical Engineering and Deputy Vice Chancellor (Student Affairs) at Universiti Teknologi Malaysia. Some of his research works through publication were given recognition and won prizes, for example prize for his publication in Journal of Power, Proceedings of Institute of Mechanical Engineers, namely "Arthur Charle's Main Prize", awarded by Institute of Mechanical Engineers, United Kingdom. Currently he is holding administrative posts as Executive Advisor of Low Carbon Transportation Research Centre in collaborating with Imperial College London and as Director of BioMedical Engineering Research Centre. He is responsible in developing the first Turbocharged Engines Laboratory for the country and among the best in the world with the collaboration of Imperial College, University of London, under the umbrella of the joint research centre called LOW CARBON TRANSPORTATION RESEARCH CENTRE UTM-IMPERIAL.

Title--- How 3D Printing Is Changing Automotive Manufacturing

Abstract--- Significant advances in additive manufacturing (AM) technologies, commonly known as 3D printing, over the past decade have transformed the potential ways in which products are designed, developed, manufactured, and distributed. For the automotive industry, these advances have opened doors for newer designs; cleaner, lighter, and safer products; shorter lead times; and lower costs. 3D printing has opened up the possibility of fast and inexpensive prototyping. Armed with this technology, designers do not need to worry about creating molds or setting up specialized machines to manufacture new parts. From steering wheels to the turbocharger, designers can use a single 3D printer to build prototypes of any car component. 3D printing has already started changing the automobile manufacturing landscape. Its prominence will only rise as the technology becomes further sophisticated and affordable. Hopefully, the points enlisted in this presentation will help the audience to understand that the impact of 3D printing on automotive sector goes well beyond just aesthetics.

SPEAKERS



Prof. Jieh-Shian Young

National Changhua University of Education, Taiwan

Jieh-Shian Young was born in Taoyuan, Taiwan, in 1964. He received the B.S. in Department of Mechanical Engineering from National Chiao Tung University, Hsinzhu, Taiwan, in 1986, and the M.S. and Ph.D. in Institute of Aeronautics and Astronautics from National Cheng Kung University, Tainan, Taiwan, in 1988 and 1991, respectively. From 1991 to 2004, he was a scientist in Chung Shan Institute of Science and Technology (CSIST). He is currently the professor and chairperson of Institute of Vehicle Engineering, National Changhua University of Education. His main research interests are centered around the theory and application of robust control, control, robust antiwindup synthesis, steering control, flight control and simulation, mission planning system of tactical fighters, interactive 3D animation programming, automotive electronics, etc.

Title--- Pedagogy of on-Vehicle Network System – CAN Bus

Abstract--- This speech reports the study results in teaching courses for control area network (CAN) systems. The CAN system course prepares students for their professional careers in vehicle network which will become more crucial and compulsory in next decades. Furthermore, this speech also shares the study for the pedagogy of CAN systems. The study utilized the inductive teaching and learning methods such as inquiry learning, problem-based learning, and project-based learning. We developed an automotive electronic training board that may confront the students with authentic problems. We also synthesized a pattern CAN unit that assists students in distinguishing their shortcomings or excellences in their hardware design. An evaluation for the hybrid approach of the inductive methods indicates that there seemed to be a significant improvement for students although the data were too insufficient to support this approach [1].

[1] J.-S. Young, "Hybrid inductive teaching methods for a course in CAN systems: a case study," International Journal of Electrical Engineering Education, vol. 50, pp. 46-56, January 2013 (SCI).

SESSIONS

December 19, 2018

Session I

[Quality Control and Industrial
Production]

🕒 13:30-15:00

📍 Auditorium 2

Chaired by TBA

6 presentations—

P2-008, P2-006, P2-016, P2-018, P2-012, P2-3005

***Note:**

- Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.
- Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.
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SESSIONS

<p>P2-008 13:30-13:45</p>	<p>Radial precision printing for the textile industry controlled by fuzzy logic Juan José Encinas C, Mario Chauca Ricardo Palma University, Peru</p> <p>Abstract— The objective of this project is to optimize the stamping process in the industry dedicated to the textile sector using fuzzy control. For this, an automated system capable of carrying out the mentioned process will be implemented in such a way that the stamping is done in an automated way and in this way reduce costs in the textile industry. This will have an alternator mechanism in which prints of various colors will be made on the fabrics, four levers that will keep the screen printing of different colors and image, and the motors will be controlled so that the stamping can be synchronized.</p>
<p>P2-006 13:45-14:00</p>	<p>The Effects of Skewed Distributions on the Performance of Variable Sample Size \bar{X} Chart Wei Lin Teoh, Michael B.C. Khoo, Zhi Lin Chong, Sin Yin Teh Universiti Sains Malaysia, Malaysia</p> <p>Abstract— The variable sample size (VSS) \bar{X} chart is one of the adaptive control charts that gains prestige in the field of Statistical Process Control during the last decade. Traditionally, the design of the VSS \bar{X} chart is based on the assumption of normally distributed data or measurements. However, in many real-life applications, the normality assumption may be violated. This paper investigates the effects of skewed distributions on the performance of the VSS \bar{X} chart. Two VSS schemes are considered in this paper, i.e. (i) the small sample size (nS) or (ii) the large sample size (nL), is predetermined for the first sample (n1). Monte Carlo simulation is adopted to evaluate the run-length performances of these two VSS schemes for different levels of skewness corresponding to Weibull, lognormal and gamma distributions. The results show that the in-control average run lengths for the VSS \bar{X} chart with n1 = nS are closer to the desired value and have a lower false alarm rate compared to that of the VSS \bar{X} chart with n1 = nL.</p>
<p>P2-016 14:00-14:15</p>	<p>Optimal Variable Sample Size and Sampling Interval Control Chart for the Process Mean based on Expected Average Time to Signal Khai Wah, Khaw; XinYing, Chew; Sin Yin Teh; Wai Chung, Yeong Universiti Sains Malaysia, Penang, Malaysia</p> <p>Abstract— A control chart is one of the effective tools in statistical process control (SPC) for improving productivity, reducing defective products and providing diagnostic information. Control charting techniques have gained increasing importance recently due to the rapid advancement in technology. Many industries tend to use control charts to monitor the quality of their products or services. The adoption of variable sample size and sampling interval (VSSI) strategy significantly improved the sensitivity of Shewhart chart in detecting small and moderate process mean shifts, in terms of average time to signal (ATS) criterion when the process shifts are specified. However, for some scenarios in real industries, the process shift size is not set to a specific value. In this case, the expected average time to signal (EATS) can be used as a measure of performance when the process shift is unknown. The EATS of the optimal VSSI chart is numerically evaluated based on a Markov chain approach. The findings show that the VSSI chart prevails over the Shewhart</p>

SESSIONS

	<p>chart under comparison. Being able to vary the sample size and sampling interval, a practitioner will have more flexibility and a better control of the process and at the same time is able to detect an out-of-control signal quicker.</p>
<p>P2-018 14:15-14:30</p>	<p>A Study on the Median Run Length Performance of the Run Sum S Control Chart Gao Han, Teh Sin Yin, Khoo Michael Boon Chong, Teoh Wei Lin Universiti Sains Malaysia, Malaysia</p> <p>Abstract— Control chart plays a very important role in Statistical Process Control. Run sum S control chart is sensitive in detecting small to moderate shifts. It is an excellent alternative to Shewhart control chart. The performance of the run sum S control chart based on median run length (MRL) performance is proposed in this study. The Statistical Analysis System (SAS) program is used to calculate the in-control ARL and in-control MRL for the nine run sum S chart schemes with different sample sizes, magnitude of shift in the process standard deviation, and the in-control run lengths. The findings show that the MRL measure provides better explanations than the ARL criterion. Moreover, the MRL performance of the run sum S chart schemes is substantially affected by the sample sizes, magnitude of shift in the process standard deviation, and the in-control run lengths.</p>
<p>P2-012 14:30-14:45</p>	<p>System of irrigation using (IoT) for environmental monitoring of crops of asparagus Jean Pierre Hidalgo, Luis Cervantes, Omar Quispe, Pedro Cangalaya, Mario Chauca Universidad Nacional del Callao, Peru</p> <p>Abstract— The management of technology in the last 20 years has greatly impacted society, allowing to increase the quality and productivity of crops in the agricultural sector. Using traditional methods of control and monitoring used in agriculture generated great losses of time and cost for farmers. This article describes the design, development and implementation of an irrigation system using hardware and free software, networks of wireless sensors, actuators, wireless communication devices and ICT tools, in order to create an environment where the Internet of Things (IoT) and Precision Agriculture offer the user a better control of the irrigation on the crop taking into account the evapotranspiration.</p>
<p>P2-3005 14:45-15:00</p>	<p>Development of Intelligent Decision Support System for Selection of Quality Tools and Techniques M.D. Mohd Amran, A.W. Mohamad Ikbar, S. Khairanum , A.B. Fairul Anwar, B. Rahmat Roslan. Universiti Kuala Lumpur, Malaysian Institute of Industrial Technology, Malaysia</p> <p>Abstract— This research derives systematic analysis and synthesize previous research published with aim to highlight and develop a decision aid for Quality Tools and Techniques (QTT) selection which enable practitioner make a rational and structured decision though development of Intelligent Decision Support System (IDSS). Vast numbers of QTT for problem-solving and improvement activities give a significant challenge to determine the suitable QTT. The chosen QTT affect the effectiveness of improvement activity and misused of QTT can slow down the improvement process and flawed the conclusion. The IDSS namely eCIFOD was produced by translating the QTT mapping into the SQL Union and SQL</p>

SESSIONS

	<p>Inner Join. PHP scripts were developed to run the system and uploaded to online after the Black Box Testing show good result. A single case with a single unit of the case study research strategy was used to conduct the user acceptance testing unveil the positive feedback from the user in term of feasibility, usability, and utility. Development of empirical IDSS for selection of QTT through providing structured and intelligent decision making provides holistic decision support for practitioner to select most optimize QTT to be used for improvement purpose.</p>
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Coffee Break

[15:15-15:30]

SESSIONS

December 19, 2018

Session II

[Aviation and Mechanical Engineering]

🕒 13:30-15:15

📍 Auditorium 3

Chaired by TBA

7 presentations—

P1-0009, P1-0015, P1-1011, P2-3003, P2-019, P2-4001, P2-5004

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SESSIONS

<p>P1-0009 13:30-13:45</p>	<p>Multi-objective Multiple Quadcopter Path Planning in Urban City Kin-Ming Lo, Leung-Yau Lo, Pak-Kan Wong, Kwong-Sak Leung The Chinese University of Hong Kong, Hong Kong, China</p> <p>Abstract— Applications using multiple quadcopters such as environment detection or packet delivery have drawn lots of interest from commercial companies. As the battery life of a quadcopter is very limited, a path planning algorithm can help to improve the efficiency of each flight. To avoid overloading some quadcopters while under-utilizing the others, the algorithm will minimize the total path lengths and balance individual path length. This problem is formulated as multi-objective multiple traveling salesman problem (MOMTSP). To generate flight paths quickly for commercial application, City Quadcopter Path Planner (CQPP) which is based on Non Sorting Genetic Algorithm II (NSGA-II) is proposed and applied to search for the solutions. Positive results are obtained from three benchmark scenarios, which are designed for testing the performance of the algorithm in solving this path planning problem.</p>
<p>P1-0015 13:45-14:00</p>	<p>Motion Control Algorithm for Path Following and Trajectory Tracking for Unmanned Surface Vehicle: A Review Paper Putri Nur Farhanah bt Mohd Shamsuddin, Muhamad Arifpin bin Mansor Universiti Malaysia Pahang, Malaysia</p> <p>Abstract— A capability of tracking and follows the target object on the water surface is an essential measurement in the control system for a Unmanned Surface Vehicle (USV). Path following algorithm usually used to describe the target, compute in the controller and minimize as well as to zero the distance between USV; and the angle between the vessel speed and the tangent to the path. USV needs to follow a time-parameterized reference curve are defined as a trajectory tracking. This paper gives an attention in reviewing a few common path following as well as path tracking techniques used in the design of USV where there is no predefined position will be declared in the control system. In particular, this paper is focused on a motion control approaches developed using USV by reviewing forty journals for last ten years. Based on the reviews, a line-of-sight (LOS) technique is a frequently implemented in the USV control system than another method such as constant-bearing guidance, Kalman filtering, PID guidance, Lyapunov-based guidance, pure-pursuit (PP) guidance, motion goal prediction, back stepping method and Jacobian task priority. As the conclusion, various types of mathematical computation are introduced in the USV control system is customizes with the requirement based on the situation needed will make this autonomous vehicle more advanced.</p>
<p>P1-1011 14:00-14:15</p>	<p>Model Identification of Space Mechanisms by Using NARX Neural Network Jiajun Xuan, Xiaodong Song, Yousheng Zhang Beijing Institute of Technology, China</p> <p>Abstract— Space mechanisms are usually affected by rigid-flexible coupling characteristics and special space environment when they are in orbit. Therefore, their models have very strong nonlinear characteristics and uncertainties. So, it is a key scientific problem that how to realize the efficient and accurate identification of in-orbit models so that they can survive</p>

SESSIONS

	<p>and keep good performance in space. In this paper, based on flexible hub-beam unit structures in spacecraft, Nonlinear AutoRegressive models with eXogenous inputs (NARX) is used to implement the autonomous evolution of the model. A modified Lipschitz algorithm is utilized to determinate the model order in advance. Then Mini-batch Gradient Descent Method is combined with efficient Automatic Differential Algorithm to make the network parameters converge to the optimal value rapidly. Finally, a simplified First-Order Approximation Coupling dynamic model is built to simulate practical system. By comparing the response results of training NARX model with those of dynamic model, it can be seen that the methods in the paper are able to realize the online models identification of space mechanisms efficiently and accurately.</p>
<p>P2-3003 14:15-14:30</p>	<p>Tool Characteristics for better Performance in machining OHNS Steel using Tungsten Carbide tool inserts A. Dr.Srikantappa.A.S,B. Shivakumara.C.M,C. Dr.Adaveesha.B Cauvery Institute of Technology, India</p> <p>Abstract— Turning Process is a important machining process in which cutting tool inserts remove material from the surface of a rotating cylindrical work piece. Machining of Oil Hardened Non Shrinking (OHNS) Steel is a challenge for production engineers in tool industry. In this research paper, a study on turning OHNS Steel using tungsten carbide tool inserts is made by varying depth of cut, feed rate and cutting speed one each at a time and keeping other two constant. The effect on process parameters like surface finish, material removal rate, tool wear, Cutting force, thrust force and temperature distribution on tool tip are discussed.</p>
<p>P2-019 14:30-14:45</p>	<p>NanoPC ARM-Based Panel Saw Machine with Industrial Internet of Things Mohannad Farag, Ehsan Aboosaeedan and Eugene Ng Keng Leong Formahero Machinery Sdn Bhd, Malaysia</p> <p>Abstract— Panel saw machines are available in different shapes and sizes, from small hand-held power saw machines to floor-mounted types. Floor-mounted machines comprise of a loading station and cutting surface where panels are transferred from the loading to the cutting station. Cutting wooden panel problem in furniture industry is one of the highest computation complexity optimization problems and belongs to rectangular layout problem. In this paper the mechanical design of floor-mounted panel saw machine is proposed. NanoPC ARM-based control system design with IIoT applications for remote and real-time monitoring, diagnostic and Machine-to-Machine (M2M) interfacing are described. The results of the cutting process are evaluated and discussed based on the measurement of the cutting size error and the customer satisfaction survey.</p>
<p>P2-4001 14:45-15:00</p>	<p>Physico-Mechanical and Tribological Properties of Glass Fiber based Epoxy Composites Vijay B R, Dr. Srikantappa A S Cauvery Institute of Technology, India</p> <p>Abstract— Polymeric materials reinforced with synthetic fibers like glass, carbon, and aramid provide advantage of high stiffness and strength to weight ratio as compared to conventional materials like wood, concrete etc. In the light of these the present</p>

SESSIONS

	<p>experimental study aims at learning the physico-mechanical and tribological properties of glass epoxy composite filled with a filler of MoS₂. Hand layout technique is employed for preparing the samples, with varying weight fraction of bi-directional glass fiber. The ratio of filler is varied between 0 to 6 wt.-%. Specimens were cut from the fabricated laminate according to the ASTM standards for different experiments. The systematic experimentation leads to determination of significant process parameters and material variables that predominantly influence the wear rate. It has been found that wear rate increases with increasing abrading distance and for 4% filler optimized wear strength were achieved. Mechanical properties of composites are increases with increase of filler. The mechanical and wear behaviour of filled composites is more superior then unfilled composites.</p>
<p>P2-5004 15:00-15:15</p>	<p>Multi-material based SLS printer interfaced with GUI Md. Hazrat Ali, Asset Ashirbekov, Shynggys Amangeldi, Gaziz Yerbolat Nazarbayev University, Kazakhstan</p> <p>Abstract— Selective laser sintering technology is a type of additive manufacturing with increasing interest in various sphere of application. Possibility to improve this technology in different directions shows the potential to enhance the multi-material manufacturing. Due to increasing complicity of the multi-material operation, there is a requirement for simplified operator interface. This paper proposes the graphical user interface for multi-material SLS printer to properly maintain compose parameters and easily perform calculations. The GUI is based on Rule of Mixture (ROM) which considers Monte Carlo Simulation (MCS) approach to increase the accuracy. The interface takes inputs from pre-defined ten polymers and performs the calculation in according to the requirement. Finally, the GUI results were verified by the FEA simulation.</p>



Coffee Break

[15:15-15:30]

SESSIONS

December 19, 2018

Session III

[Robot Control and Biomedical
Engineering]

🕒 15:30-17:30

📍 Auditorium 2

Chaired by TBA

8 presentations—

P1-0008, P1-0019, P1-1008, P2-007, P1-0001, P1-0014, P1-0016, P1-1009

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<p>P1-0008 15:30-15:45</p>	<p>Embedded Cdio Approach Via Mobile Educational Robot Competition Ilham Rustam, Mohamad Taib Miskon, Zulzilawati Jusoh, Wan Ahmad Khusairi Wan Chek and Fadhli Dzul Hilmi Mohd Fauzi Universiti Teknologi MARA, Malaysia</p> <p>Abstract— This paper examines its research findings that are instigated on Introduction to C Programming course modules through the use of mobile FRDM ARM-based microcontroller robot. Subsequently, elements of CDIO were also incorporated onto the subject matter. These elements were constructed such that it challenges student sense of rivalry, creativity and curiosity by holding a contest between each group hardcoded mobile robot to see who could achieve workability, perform set tasks and ultimately, fastest lap speed. To achieve these objectives, each group of students needs to familiarize themselves with basic C Programming syntax as well as creatively manipulate selection, repetition and function statements. A survey was conducted to give quantitative values towards four measured criteria that are extrinsic motivation, intrinsic motivation, interest, and attainment value, reflected in this study as research findings. Results showed that participated student gave glowing positive feedback, increases interest in learning programming and in preferences over proposed approach as opposed to conventional theoretical classes, lab works and mini project.</p>
<p>P1-0019 15:45-16:00</p>	<p>A strategy of quadruped robot to climb vertical cliffs in imitation of goats Lindong Mu, Bo Su, Peng Xu, Zhenjie Liang, Chenxing Jiang, Ruina Dang and Qindan Deng China North Vehicle Research Institute, China</p> <p>Abstract— Based on the principle of goats climbing cliffs, this paper proposes a new quadruped robot climbing strategy from the aspects of mechanical structure and behavior modes. The characteristics of connecting rods are utilized to keep steady of robots between opposite cliffs, which eliminates the need of foot-end suction and clamping mechanism.</p>
<p>P1-1008 16:00-16:15</p>	<p>Real Implementation of Fault-Tolerant Sliding Mode Control for a Robot Manipulator Quang Dan Le, Hee-Jun Kang University of Ulsan, South Korea</p> <p>Abstract— In this paper, an active fault-tolerant sliding mode control of robot manipulator is proposed and real implemented for a 3-DOF robot manipulator. When the unknown actuator faults occur sometime during the robot operation, an external linear state observer is adopted to estimate uncertainties/disturbances and faults. By using this observer, we no need the exact knowledge of the upper bound of fault. Then, the active fault-tolerant sliding mode control with online compensation based on the estimation is proposed. The stability of system was proved by using Lyapunov theory. Finally, the simulation and experimental results for a robot manipulator are shown to illustrate the effectiveness of the proposed control.</p>
<p>P2-007 16:15-16:30</p>	<p>Toe Angle Measurement for z-Axis Calibrations of the Toe Sensor Based on MCU Jieh-Shian YOUNG, Hong-Yi HSU Institute of Vehicle Engineering National Changhua University of Education Changhua,</p>

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	<p>Taiwan</p> <p>Abstract— This study aims at developing an alternative approach to the toe angle inspection system for the vehicle wheel alignments. It will apply the inertial sensor, including accelerometers and gyro, to implementing the MCU-based toe angle inspection system instead of the current commercial measures which adopt the computation vision-based techniques. The inspection system by the proposed approach is much cheaper and more convenient than those by the computer vision-based ones. The coordinate transformations from a vehicle to the inspection system are built in order to obtain the relation between the x-axis of the inspection system and that of the vehicle. The orientations of the wheel can be evaluated through the data including 3 axial accelerations and Euler angles acquired from the inertial sensor. Therefore, the toe angle can be calculated by the orientations of the wheels and the vehicle through some vector operations. This paper proposes an approach to calibrating the z-axis of the inspection system (sensor) from the misalignments to the based axes of the equipped gyro. The proposed approach is practical and feasible in application from the off-line authentication. The algorithm according to the proposed approach is also provided. This study will be expected to facilitate the toe angle inspection through the z-axis calibrations for the system. The integration of the toe angle and camber angle inspections form the proposed approach will achieve the goal to develop a wheel alignment inspection system that is affordable and more convenient to operate without downgrade of the precision. Besides, the evaluated results of camber angle inspections can be transmitted via the media such as RS232, Bluetooth, Wi-Fi, etc.</p>
<p>P1-0001 16:30-16:45</p>	<p>Design of a Wearable Walking Aid Based on Anthropometric Measurement of Cerebral Palsy Children in Malaysia Adzly Anuar, Farid Mahamud, Juniza Md Saad and Kesavan Rana Singam Universiti Tenaga Nasional (UNITEN), Malaysia</p> <p>Abstract— Children suffering from cerebral palsy (CP) tend to have difficulties in moving around, as the condition would affect their walking gait posture. A suitable walking aid would help CP children to maintain balance and body posture during standing and walking. Due to their condition, CP children often have different anthropometric measurement or body sizes compared to children without disabilities. This is one of the biggest challenges as designing assistive devices such as the walking aid, would require suitable dimensions, otherwise it would not fit and cause discomfort, or might further deteriorate the condition of the CP child. This paper describes the work done to acquire anthropometric measurement from CP children in Malaysia and utilizing these measurements in designing the wearable walking aid.</p>
<p>P1-0014 16:45-17:00</p>	<p>Design of Mechanism and Control System for a Lightweight Lower Limb Exoskeleton Bingshan Hu, Hongyang Yu, Hongrun Lu and Yongjie Chang University of Shanghai for Science and Technology, China</p> <p>Abstract— Neurological diseases such as stroke and spinal cord injury can lead to lower limb movement disorders, and gait training is an important means for rehabilitation of</p>

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	<p>lower limb dysfunction. The lower limb exoskeleton robot is a new technique of rehabilitation training for lower limb dysfunction, but lower limb exoskeletons are very heavy and are not easy to wear nowadays. To reduce weight, only the hip joint of the lower limb exoskeleton designed in this paper is driven by motor, and both knee and ankle joint are unpowered joints. Based on the principle of torsion spring clutch, the knee joint can reliably switch the swing phase to the standing phase. This paper also introduces the control system framework of the lower limb exoskeleton and the control method based on finite state machine. Finally, experiments on gait recognition based on foot pressure are carried out.</p>
<p>P1-0016 17:00-17:15</p>	<p>A Wearable Wireless Brain-Computer Interface Using Steady-State Visual Evoked Potentials Alfred Lim, Wai Chong Chia University of Nottingham – Malaysia Campus, Malaysia</p> <p>Abstract— The objective of this study is to investigate the feasibility of a single-electrode electroencephalogram (EEG)-based brain-computer interface (BCI) in differentiating two conditions. This approach has the potential to be implemented as a computer input device for users to express choices (e.g., left and right, yes and no). The attentional allocation of participants among boxes that each flicker at a different frequency (e.g., 8.6 Hz and 12 Hz) can be distinguished based on EEG alone. Traditionally, steady-state visual evoked potentials (SSVEPs) are studied using multi-channel EEG systems, which greatly hinders the user's mobility. Although SSVEPs are mostly examined in the frequency domain and from the occipital region of the brain, we tested five classifiers with 44 features extracted from the EEG, recorded using an electrode at the frontopolar area (FP1). Apart from using frequency-domain features, such as fast Fourier transform (FFT) coefficients and power spectral density (PSD) features, we also included time-domain features from the pre-frontal region and achieved an average classification accuracy of 74.58% using a random forest (RF) classifier.</p>
<p>P1-1009 17:15-17:30</p>	<p>Study of Robotic System Design in Iron and Steel Enterprises Xiaodong Hao, Yan Bian, Zihao Yin, Shun Wang, Chi Yang China Iron and Steel Research Institute Group, China</p> <p>Abstract— The intelligent structure system is described in the paper based on three modules, including intelligent workshop, intelligent production and intelligent monitoring. The intelligent workshop is the starting point to design and study the system structure of robot. The classical application of robot in the region of steel rolling is introduced in the paper. The application of zinc dross removing robot in practice is also demonstrated</p>



Dinner @ TBA

[17:30-20:00]

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December 19, 2018

Session IV

[Computer Aided Computing and
Information Technology]

🕒 15:30-17:30

📍 Auditorium 3

Chaired by TBA

8 presentations—

P1-0002, P2-5003, P2-3004, P1-0003, P1-0005, P1-0006, P1-0017, P1-1003

***Note:**

- Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.
- Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.
- One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded when the session is over.

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<p>P1-0002 15:30-15:45</p>	<p>Medical Images Sequence Normalization and Augmentation: Improve Liver Tumor Segmentation from Small Dataset Thanh Nghia Truong, Vu Duy Dam and Thanh Sach Le HCMC University of Technology Vietnam, Vietnam</p> <p>Abstract— Using deep learning for Medical Images Diagnosis automatically is a new trend in recent years. Concretely, the fundamental step in these studies is the automatic segmentation system for human organ, that has the benefit of accuracy in the diagnosis process for medical images (CT images). Traditionally, if there is no module of automatic segmentation system, this process has to be performed by the experience of specialized physicians. More importantly, this process takes much time of physicians, while the automatic segmentation system can alternative efficiently. However, the accuracy and responsiveness are the challenges for a segmentation system with a small organ or small tissue, i.e., a liver tumor, because of the lack of data for deep learning.</p>
<p>P2-5003 15:45-16:00</p>	<p>Sustainable Competitiveness of Hotels Business in Thailand Kanitta Ounarat, Woranat Sangmanee and Singha Chaveesuk King Mongkut’s Institute of Technology Ladkrabang, Thailand</p> <p>Abstract— The rapid development in the technology has drastically changed the dynamics of the business industries. This has been also witnessed in the hotels business, upon the integration of, it has made extremely competitive in the business top operate in the industry. This has also given the room for small business owners to enter several markets, which also includes the hotel business. In the recent times, a lot of hotel business ranging from big to small targeting customers in the local areas and also through the online social platforms also recognized as the website agencies. At the same time, offerings customers with more value in terms of customer service has made also hotel business extremely competitive The customers has wide selection of services taking help from the technological benefits such as artificial intelligence or AI as being the helpful tools for business to offer customers with the personalized services answering their needs eventually helping the business to grow and achieve the sustainable competitiveness. The purpose of this research is to investigate Sustainable Competitiveness of Hotels Business in Thailand: A Conceptual Framework. The theoretical framework of this study is based on the McKinsey 7S Model, PESTLE Analysis, Task-Technology fit, and Five-Force Model. The conceptual framework consists of independent variables such as internal analysis and external analysis influencing the sustainable competitiveness of hotel business in Thailand. This research has been based with seven hypotheses as will be introduced in the paper.</p>
<p>P2-3004 16:00-16:15</p>	<p>Autonomous Controllers for Urban Traffic Management Abdul Mateen, Sabeen Sher, Tooba Akhtar, Mahmood Ashraf and Rubina Adnan Federal Urdu University of Arts, Science & Technology, Pakistan</p> <p>Abstract— The computational capabilities of computers enable human being to control the vehicles and its traffic easily. Such traffic control system not only reduces the effort of human but also provides secure and accurate results. Here, architecture of Agent-Based Autonomous Controller (ABAC) is proposed that manages vehicles at traffic signals</p>

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	<p>intelligently. The proposed solution is followed by a case study that reveals the performance over the previous traffic control and management architectures.</p>
<p>P1-0003 16:15-16:30</p>	<p>Robotic Vision based PCB inspection with IOT interface S. Gobee, V. Durairajah, K. Xin, L.L.Jie Asia Pacific University of Innovation and technology Kuala Lumpur, Malaysia</p> <p>Abstract— The purpose of the project is to design a fully automated vision inspection system as well as a pick and place system. This system aims is to be able to perform vision inspection on PCB board to identify the quality of such product before pushing the product to the pick and place system for product segregation. The next aim of this project is also to ensure there are information continuity from machine to another machine to minimize human labor while ensuring high job traceability using IOT monitoring. Furthermore, information gathered from the station which are captured the sensor and vision from the machine can then be viewed either on the station or through the web page. This allows high flexibility in terms of accessing to information from machine as well as monitoring of the condition process of the machine without being physically present. In addition, this project also requires less labor due to fully automation where PCB are push to the next station using the conveyor system which means less time wasted on human transporting product from one machine to another and thus optimizing the entire process flow. Lastly, information gathered from machine on the production short floor are all stored on the database which can be integrate through the company database or through cloud base providing huge flexibility for easy integration of such system into any production line.</p>
<p>P1-0005 16:30-16:45</p>	<p>Automatic Vision Based Classification System Using DNN and SVM Classifiers Vickneswari Durairajah, Suresh Gobee and Amgad Muneer Asia Pacific University of Technology and Innovation, Malaysia</p> <p>Abstract— In this paper, we construct an automatic classification vision system that is designed to recognize Malaysian herbs that are typically used for medical or culinary purposes. The proposed system employs two classifiers, Support Vector machine (SVM) and Deep Neural Network (DNN). The two classifiers have been implemented using OpenCV-Python. For the training test SVM achieved 86.63% recognition accuracy and DNN (TensorFlow) achieved 98% recognition accuracy. For the real life testing SVM achieved 74.63% recognition accuracy and DNN achieved 93% recognition accuracy. In the proposed system a total of 1000 leaves were used. A total of 50 samples of herbs were collected for each class and they were divided into two datasets. The first dataset which consisted 60% of the herbs samples were used for the training purpose and the other dataset with 40% of the herbs samples were used for the testing purpose. The time taken for each recognition process was 4 seconds for SVM and 5 seconds for DNN classifier. Also, the proposed system is capable of identifying the herbs leaves even though they are wet, dried and deformed with a recognition accuracy of 52.50%. Finally, based on the experiments that were done, the system proved to be very efficient and accurate with the highest recognition rate being 98%. The results indicate that the techniques used in the proposed system are significantly efficient when compared to the various techniques employed in the existing literature.</p>

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<p>P1-0006 16:45-17:00</p>	<p>Handwritten Mathematical Expression Recognition Using Convolutional Neural Network Giang-Son TRAN, Chi-Kien HUYNH, Thanh-Sach LE, Tan-Phuc PHAN, Khanh-Ngoc BUI Ho Chi Minh City University of Technology, Vietnam</p> <p>Abstract— Recognizing mathematical expressions on raster images usually consists of two steps: detecting individual symbols and analyzing their spatial structure to form a coherent equation. In this work, we focus on the first step and propose a detection method that is able to locate small and difficult handwritten symbols. We use a deep convolutional neural network with robust detection performance. It is able to achieve a mean average precision score of 0.65 for 106 different mathematical symbols on the dataset we created. For structural analysis, we use the DRACULAE parser since it has high accuracy given that the symbols were correctly detected.</p>
<p>P1-0017 17:00-17:15</p>	<p>EMB-SLAM: An embedded efficient implementation of Rao-Blackwellized Particle filter based SLAM Qiucheng Li, Thomas Rauschenbach, Andreas Wenzel and Fabian Mueller Water and Mobile Systems, Fraunhofer IOSB-AST, Germany</p> <p>Abstract— Simultaneous localization and mapping (SLAM) algorithms are an essential component for autonomous mobile robotics to be able to operate in a priori unknown environments. In the last two decades, plenty of SLAM algorithms have been developed and also a number of optimizations have been done for those algorithms. But rarely optimization approaches to low-cost and energy-efficient embedded systems which are suitable for indoor robotics have been done. The benefit of the development of embedded systems should be explored. With the emerging of new technologies (multi core, ARM® NEON™) which can greatly accelerate the processing speed, rethinking the implementation of algorithms should be done. In this work, a new embedded efficient Rao-Blackwellized particle filter based Simultaneous Mapping and Localization (EMB-SLAM) implementation is presented. It is based on the co-design with the multi-core embedded hardware, a SLAM algorithm and an optimization methodology. EMB-SLAM is tested with real datasets. Experiments show the real-time performance of this implementation, and demonstrate that the embedded system is suitable for realizing SLAM applications under real time constraints.</p>
<p>P1-1003 17:15-17:30</p>	<p>Proposal of Effective Orthogonal and Hexagonal Hierarchical Structures for Disc Queries Vojtěch Uher, Petr Gajdoš, Václav Snášel VŠB-Technical University of Ostrava, Czech Republic</p> <p>Abstract— The Fixed-Radius Nearest Neighbors (FRNN) query is a common task in scientific areas dealing with multidimensional point clouds (PCs) such as computer graphics, image processing, geographic information systems, machine learning and pattern recognition. We especially focus on 2D points in this paper. The FRNN means search all the points within defined radius for tasks when local properties of data are crucial. As this procedure is time consuming, an effective accelerating structure indexing the points is required. The standard methods are based on the orthogonal grids subdividing the space into uniform cells or hierarchies of orthogonal grids. However, several papers highlight the regular hexagonal</p>

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	<p>grids for their superior theoretical metrics, e.g. better coverage of query discs, uniform distance to all six neighbors or lower number of passed cells. This paper provides a comparison of effectiveness of orthogonal and hexagonal hierarchies and traditional algorithms for FRNN disc queries. To do this, we propose a novel hierarchical method based on the hexagonal space-filling curve called the Node-Gosper curve which defines the hierarchical location of points in the hexagonal grids and their linear order. This method is tested with similar structure based on the orthogonal Z-order curve to show the real features of both approaches in practice.</p>
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Dinner @ TBA

[17:30-20:00]

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<p>P1-0004</p>	<p>Cloud-based UAV Monitoring and Management Framework Chi Chen, Dianxi Shi, Shuyao Cui and Yaru Kang National University of Defense Technology, China</p> <p>Abstract— As an emerging technology, unmanned aerial vehicles(UAVs) are quietly changing people’s lives and may revolutionize the commercial and industrial sectors. Because of the characteristic of long-time, high-intensity, high-precision, and adaptability to harsh working environments, UAVs not only have applications such as investigations in the military field, but also have developed in areas such as natural disaster relief and logistics distribution. With the increase in the number of military UAVs and commercial UAVs, the management and monitoring of multiple UAVs is particularly important. The monitoring and management of UAVs involves many technologies such as image processing, wireless transmission, and remote monitoring. It has great technical challenges for research and is currently a hot international research topic. In this paper, we propose an innovative cloud-based service-oriented UAVs monitoring and management framework to provide real-time flight monitoring and management for UAVs. We register and connect UAVs through the HTTP interface provided by the framework. For each connected UAV, data from the GPS sensor, altitude sensor, angular velocity sensor, gyro sensor, etc. represents the internal state of the UAV, the framework provides a real-time visual display. The real-time annotation of the position and path information of the UAV through the dynamic map enables the user to easily realize the monitoring and management of the multiple UAVs. This framework solves the problem of using UAVs through the Internet and proves its feasibility and performance through simulation.</p>
<p>P1-1005</p>	<p>Position control and vibration suppression for flexible-joint surgical robot Shuizhong ZOU, Bo PAN, Yili FU, Shuxiang GUO Harbin Institute of Technology, China</p> <p>Abstract— To achieve vibration suppression and precise position control for minimally invasive surgical robot during intraoperative operation, a compound control method composed of an input shaper and a pole-placement predictive function controller (PPFC) is proposed. First, the flexible-joint dynamic model of the 3-degree of freedom remote center motion (RCM) mechanisms of minimally invasive surgery robot is linearized by using the gravity compensation, and then the linearized dynamic model is decomposed into four parallel first-order sub-models. Next, PPFC is used to realize the position tracking of the robotic arm in the movement, and ZV input shaping is used to suppress the residual vibration of flexible-joint manipulator after stopping motion. Finally, the comparative experiments are conducted to evaluate the performance of the proposed method.</p>
<p>P1-1006</p>	<p>Towards Dynamic Task/Posture Control of a 4DOF Humanoid Robotic Arm Omar T. Abdelaziz1, Shady A. Maged2, Mohammed I. Awad3 Mechatronics Engineering Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt</p> <p>Abstract— A comparison between two control schemes of a humanoid robot arm is considered, facilitating the development of humanoids that have human-like movements</p>

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	<p>and safe to operate in the vicinity of humans. This paper describes modeling and simulation of a 4 degree of freedom (DOF) INMOOV humanoid robotic arm using MATLAB/Simmechanics toolbox. The proportional derivative (PD) control and sliding mode control (SMC) based on the operational space formulation of task/posture control is considered. The comparison between the two controller approaches in respect to accuracy, natural movement and time response is also presented.</p>
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