Association for Machines and Mechanisms News Bulletin

Volume 7, No. 4 October 2015

Objectives and Activities

The main objective of AMM is to contribute to mechanical design at all levels starting from academic research to industrial initiatives, thereby enhancing the quality and reliability of indigenous machines. With this in view, AMM organises the International & National Conference on Machines and Mechanisms, iNaCoMM, and the workshops on Industrial Problems on Machines and Mechanisms, IPRoMM regularly.

Inside This Issue

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Message from the Editor-in-Chief

During the auspicious festival season of *Sharadia Durga Puja* and *Muharram* just after it, Bulletin of the Association of Machines and Mechanisms (AMM) with the volume 7, issue No. 4, October 2015 is being published. I heartily wish you the best in this festive season. Dr. Shital S. Chiddarwar (Zonal Vice President- West) and her team of researchers and students have extended active support to bring out this issue. Dr. G. Sarvana Kumar, Secretary AMM, Dr. C. Amarnath, President AMM and other office bearers of AMM have also given background support for this issue.

Dr. Shital S. Chiddarwar has written a technical note about "Robot Programming by Demonstration" that consists of some of her experience in this area. I thank her to co-edit this issue and for writing this note instead of a formal editorial to benefit persons interested in robotics.

Two contributed articles are included in this issue. "Robotics Application in Orthotic and Prosthetic Devices- New Research Direction" explains about the application of robotics for rehabilitation. This article makes some overview and then lists some works done at Indian Institute of Engineering, Science and Technology, Shibpur, Howrah. Prof. S. Bhaumik and his team of students have outlined research activities conducted related to robotics prosthetic and orthotic device including development of an active ankle for transtibial amputees driven by user's EMG signal. The other article, "Design of Articulated Arm Mechanism for Operation of Rotating Valves" is the contribution of Aditya Deole and Vijay Kulwant, students of the Department of Mechanical Engineering of VNIT, Nagpur. The Editor-in-Chief sincerely acknowledges the role of office bearers and Editorial Board members for reviewing technical articles and briefs. Review comments were utilised to revise the articles for inclusion in the bulletin.

AMM members are requested to contribute articles and send same to the editorial team for January 2016 issue. Constructive suggestions, comments for improvement in the Bulletin of the AMM are most welcome. On behalf of the Editorial Team of the Bulletin of AMM, I express my sincere gratitude towards all concerned for their support, wishes and suggestions for bringing out of this Bulletin.

I reiterate that active members of the AMM may think whether an International Journal of the AMM can be thought of in near future to promote the Machines and Mechanisms community further.

Wish you all Happy Seasons Greetings!

Prof. Santanu Das
Editor–in–Chief

Robot Programming by Demonstration

The programming of robot systems is a difficult, skilled and time consuming task. The simplification of the programming methods and development of alternative programming approaches has been an area of research in last few decades. Robot Learning from Demonstration (LfD) or Robot Programming by Demonstration (PbD) (also known as Imitation Learning) is a technique evolved to enable robots to autonomously perform new tasks. Unlike conventional ways of programming, in this technique, LfD – PbD derives an appropriate robot controller from observations of a human's own performance. The main aim of LfD-PbD is to make robot adaptive to novel situation without relying on programming skills of the user. The problems faced by LfD-PbD are similar to real life situations when one has to select a school of thought. The questions like, What to imitate? How to imitate? When to imitate? Whom to imitate? are of major concern. However, researchers have tried to give an appropriate answer to first two questions but later two have subjective solutions and hence solutions cannot be generalized. What to imitate relates to the problem of determining which aspects of the demonstration should be imitated. In another words, it's a notion of affordance learning. To answer these issues, statistical methods, kinematic models and constraints are used to filter out the information not necessary for robot programming and can be safely ignored. Hence, answer to first question is a goal driven programming than simple point to point imitation. The vital aspect in determining relevant and irrelevant information is understanding the metric used for evaluation of behaviour of robot. How to imitate comprises of determining how the robot will actually execute the learned skill in order to successfully complete the desired task. Usually due to differences in the physical epitome of the human and robot, the robot cannot act in a same way as the human does.

A fundamental problem is to create an appropriate mapping between actions of the two embodiments to achieve the desired effect by the imitator. This issue is closely related to the Correspondence Problem. In literature, methods like synergy approach, configuration space mapping, rule based methods like fuzzy logic, probabilistic methods like hidden Markov model with Gaussian mixture model, hidden semi Markov model, artificial neural network are being reported. These methods ensure that the robot learns skills from the demonstration and not just the task. The reliability of information gathered and transmitted is highly dependent on the interface used to provide demonstrations. The commonly used interfaces are

A) Directly recording human motions
B) Kinesthetic teaching and
C) Immersive teleoperation scenarios.

The information thus gathered needs to be encoded for robot programming. Two types of approaches are used:

a) a low-level representation of the skill, taking the form of a non-linear mapping between sensory and motor information, and

b) a high-level representation of the skill that decomposes the skill in a sequence of action-perception units.

With these methods available in practice, imitation learning for humanoids, industrial robots, mobile robots and other hobby robots is successfully demonstrated by various researchers. However, with advent of this technology, new questions are posed every now and then. Generally, work in LfD-PbD assumes a fixed robot control policy to learn appropriate parameters. To generalize the usage of technique, it should be capable to select the most appropriate control policy like human. Furthermore, there are no protocols reported to determine when it is best to switch between the various learning modes available. The approaches developed till now consider that the teaching is usually done by a single teacher, or teachers with the clear understanding of the task to teach. More work need to be done to answer the questions related to conflicting demonstrations by different teachers with different styles. Similarly, teachers are usually human beings, but could instead be an arbitrary expert agent like an intelligent robot, computer simulation or an animal. From continuous efforts of researchers worldwide, it is evident that the improvised LfD or PbD approaches will be developed soon to accommodate few of these issues to give an intuitive, robust and generalized approach to teach robots.

Dr. Shital S. Chiddarwar
Zonal Vice President (West)

About the Association of Machines and Mechanisms (AMM)

The AMM headquarter is currently located at the Department of Engineering Design, IIT Madras. A new set of office bearers have taken charge of the affairs of AMM. AMM invites both individual and corporate membership from Indian academia, research organizations and industry. Membership benefits and other information about AMM are available at www.ammindia.org. The body of Zonal Vice Presidents (ZVPs) is active over the past several years with representations from the four corners of the country. They are playing the role of nodal agencies so as to decentralise the AMM official activities and to organise workshops under the aegis of AMM to popularise the mechanism science in their respective regions. They also form the editorial team of this news bulletin. AMM invites contributory articles from its members and others working in the various fields of mechanisms science for this quarterly news bulletin. Interested people can contact the editorial team.

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Strive not to be a success, but rather to be of value.

--- Albert Einstein

Notice of the General Body Meeting of AMM

NOTICE

Dear **Members,**

The General Body Meeting of the society is convened as per schedule below on the sidelines of the iNaCoMM 2015 conference.

Date: 17th December, 2015
Time: 6.00 PM
Venue: IIT Kanpur, Kanpur- 560 012

Agenda: (Tentative)

- Welcome address by the President.
- Presentation of report by the Secretary.
- Presentation of statement of accounts by the Treasurer.
- Discussions / declarations on the next venue for iNaCoMM(December 2017) and IPRoMM (December 2018).

Expression of interest is invited from interested institutions to host the above events. iNaCoMM is held over three / four days. This includes a one day preconference workshop and rest of the days for conference proceeding including keynote talks, paper / poster presentation and student mechanism design contest. IPRoMM is held over two days. The event focuses on discussions and paper presentation in the domain of industrial problems on machines and mechanism. Prospective host can visit AMM website to know more about the events (past event archives, reports etc.) and then send letter of expression of interest duly signed by head of the institution to the Secretary, AMM by email / post so as to reach **before 10th December 2015**.

Based on the response there will be discussion and declaration of the host.

- Conducting events like workshops, short term courses, Mechanism Olympiad etc. under the aegis of AMM.
- Promotion of SMDC and other student activities.
- Office bearers and their tenure.
- Any other matter with the permission of the Chair.

Kindly make it convenient to attend the meeting.

Best regards,

G Saravana Kumar
Secretary, AMM

About the International Federation for the Promotion of Mechanism and Machine Science (IFToMM)

How IFToMM can be reached

- Through your local Member Organization, to become active in IFToMM
- Through an IFToMM Technical Committee Chairperson, to participate in a specific activity
- Through the IFToMM Executive Council
- Through the IFToMM Secretary General:
  Prof. Teresa Zielinska, Warsaw Uniwersity of Technology, MEiL, ul.Nowowiejska 24, 00-665 Warsaw, Poland

IFToMM Presidents

From left to right: Giovanni Bianchi (1984-1987 and 1988-1991), Arcady Bessonov representing Ivan I. Artobolevsky (1969- 1971 and 1972-1975), Bernard Roth (1980-1983), Jorge Angeles (1996-1999), Kenneth J. Waldron (2000-2003 and 2004-2007), Leonard Maunder (1976-1979), Adam Morecki (1992-1995), Marco Ceccarelli (IFToMM Secretary General 2004-2007, President 2008-2011). Yoshiko Nakamura – current President

Main activities of IFToMM

- meetings, conferences, publications, direct collaboration
- 47 IFToMM Members of territory and national Organizations

- 13 Technical Committees:
  - Biomechanical Engineering
  - Computational Kinematics
  - Gearing and Transmissions
  - Linkages and Mechanical Controls
  - Micromachines
  - Multibody Dynamics
  - Reliability
  - Robotics and Mechatronics
  - Rotordynamics
  - Sustainable Energy Systems
  - Transportation Machinery
  - Tribology
  - Vibrations
- 4 Permanent Commissions:
  - Communications, Publications and Archiving
  - Education
  - History of MMS
  - Standardization of Terminology

- 6 affiliated Journals and 2 book series:

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http://www.journals.elsevier.com/mechanism-and-machine-theory/
Problems of Mechanics http://pam.edu.ge
Open-access Mechanical Sciences
http://www.mech-sci.net
Chinese Journal of Mechanical Engineering
http://www.cjmenet.com
Journal of Vibration Engineering & Technologies
http://www.tvi-in.com/
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Book series on MMS
http://www.springer.com/series/8779
Book series on History of MMS
http://www.springer.com/series/7481

- A World Congress every 4 years

IFToMM

International Federation for the Promotion of Mechanism and Machine Science

Mission
To promote research and development in the field of Machines and Mechanisms by theoretical and experimental methods, along with their practical application

Vision
To provide leadership for cooperation and development of modern results in the Mechanism and Machine Sciences by assisting and enhancing international collaboration

IFToMM webpage:
http://www.iftomm.org

IFToMM, April 2014

Bodies of IFToMM

General Assembly

The General Assembly is the supreme body of the Federation and determines its policy. It is composed of the Chief Delegates of IFToMM Members and members of the Executive Council.

Executive Council

The Executive Council manages the affairs of the Federation between the sessions of the General Assembly. It is elected every four years, meets annually, and is composed of the President, Vice- President, Secretary-General, Treasurer, and six ordinary members.

Commissions and Committees

Each Permanent Commission and Technical Committee is composed of a Chairperson, appointed by the Executive Council, a Secretary and members, nominated by the Chairperson and appointed by the Executive Council. A Chairperson shall not serve for more than two terms consecutively. The general goals for the work of the Commissions and Committees are aimed at promoting their fields of interest by attracting researchers and practitioners, including young individuals, in order to:

- define new directions in research and development within their technical areas;
- establish contacts between researchers and engineers;
- initiate and develop bases and procedures for modern problems;
- promote the exchange of information;
- organize national and international symposia, conferences, summer schools, and meetings.

Member Organizations

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UNITED KINGDOM USA
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Welcome to Taipei, China-Taipei, venue of the 14th IFToMM World Congress, 25-30 October, 2015,

www.iftomm2015.tw

IFToMM supported Conferences (selection)

Int. Symposium on History of Machines and Mechanisms (HMM)
Workshop on Computational Kinematics (CK)
Rotordynamics Conference
CISM-IFToMM Symposium on Robot Design, Dynamics, and Control (ROMANSY)
Mechanical Transmission Applications (MeTrApp)
Symposium on Robotics & Mechatronics (ISRM)
European Conf on Mechanism Science (EUCOMES)
Asian Conference on MMS (ASIAN MMS)
Summer Schools

Conferences under IFToMM patronage (selection)

Local conferences of the IFToMM Members
Symposium on Theory and Practice of Robot and Manipulators (SYROM)
IFToMM-FeIbIM Int. Symposium on Multibody Systems and Mechatronics (MUSME)

Joining IFToMM Member Organizations gives the following benefits:

international contacts for potential developments of joint projects;
reduced registration fees for IFToMM supported conferences;
participation and contribution in IFToMM activities and publications;
flow of information on IFToMM activities.

You are kindly invited to join IFToMM and its activities.

Robotics Application in Orthotic and Prosthetic Devices- New Research Direction

Oisheee Majumder, Ananda Sankar Kundu and Subhasis Bhaumik*

School of Mechatronics and Robotics, Indian Institute of Engineering Science & Technology (IIEST), Shibpur, Howrah, West Bengal, India, Corresponding author email: *sbhaumik_besu@yahoo.co.in

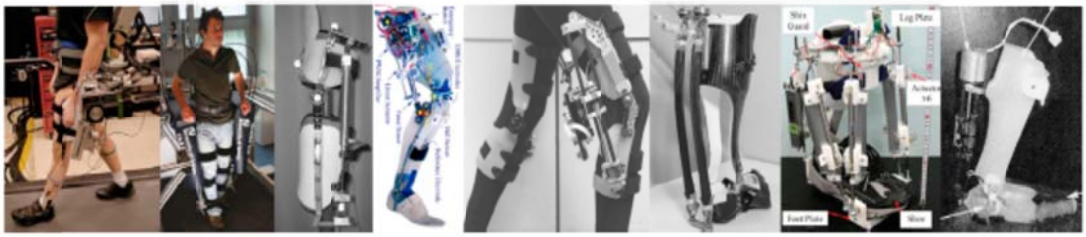
Rehabilitation robotics is a promising and emerging field and recently much research works are focused in this direction due to a high socio economic impact these works generate. Every year there is huge number of people reported suffering from mobility disorder due to SCI or amputation. To these people, mobility solution provided however is not sufficient. Orthotic and prosthetic solutions are mostly passive and manually controlled. Robotics technology can greatly improve and reshape the present day prosthetic orthotic devices.

Recent advancement in rehabilitation robotics has been inclusion of active joints for prosthetic and orthotic devices, development of walking pattern generator based on user intention, human machine interface, developing efficient drive technologies for active control, robust and failsafe control algorithm etc. The field itself is diverse and research directions are all dependent on specific application like which joint to control upper limb or lower limb, level of amputation, nature of injury etc.

In the area of lower limb prosthesis, there has been a great deal of research for developing robotic devices for transtibial amputees. Prosthetic knee and ankle joints has been developed which are controlled by user's myoelectric signal and there is active power generation at joints. In orthotic device, there has been development related to knee joints for load augmentation, exoskeleton development for medical and military purposes. Some of the recent developments in robotics prosthetic orthotic devices are shown in Fig.1(a-b) which are research works from across the globe of various universities.

a) b) c) d) e) f) g) h)

Fig.1a. View of some of the recent developments in robotics prosthetic orthotic devices [a) ABLE © 2006 IEEE, b) Nurse Robot Suit © 2004 IEEE,c) WWH © 2005 IEEE, d) Lower-limb exoskeleton by N. Tagliamonte et al© 2013 IEEE, e) EXPOS © 2006 IEEE, f) Power assist wear by D. Sasaki © 2013 IEEE, g) Soft Exosuit © 2013 IEEE, h) MIT Exoskeleton © 2007 World Scientific]



i) j) k) l) m) n) o) p)

Fig.1b. View of some other recent developments in robotics prosthetic orthotic devices
[i) ALEX II © 2013 IEEE, j) LOPES © 2011 Springer,
k) Hip exoskeleton by C. Lewis et al.© 2011 Elsevier, l) TUPLEE © 2008 IEEE,
m) MIT knee exoskeleton © 2008 IEEE,
n) Ankle–foot orthosis (AFO) by P. Kao et al. © 2010 Elsevier,
o) Stewart-platform-type AFO by H. Takemura © 2012 IEEE, p) MIT AAFO © 2004 IEEE]

At IIEST, Shibpur, students are also conducting research activities related to robotics prosthetic and orthotic device including development of an active ankle for transtibial amputees driven by user's EMG signal. Robotic Ankle has an adaptive controller for surface and anthropomorphic variations. Also work is in progress for development of active lower limb exoskeleton for mobility regeneration and enhancement purpose as outlined in Fig.2 through Fig.4. All the developments include state of art technology for better human control and adaptability. A team of researchers are also developing special wearable sensors and efficient drive technology for better human machine interface and control.

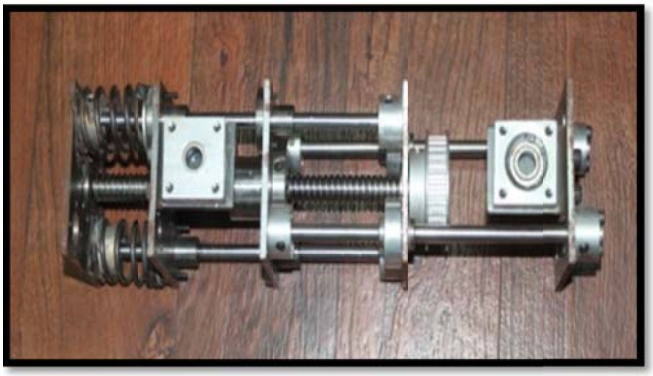


Fig.2. Series Elastic Actuator

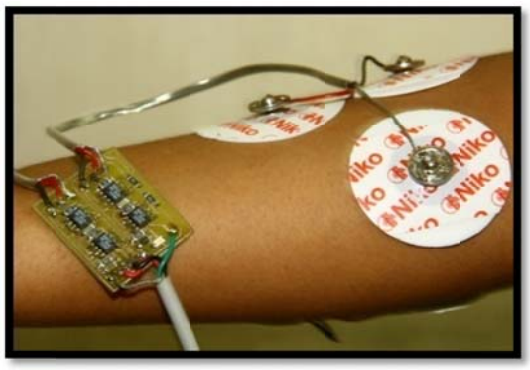


Fig.3. EMG acquisition Unit

Fig.4. Ankle foot Prosthesis

Design of Articulated Arm Mechanism for Operation of Rotating Valves

Aditya Deole[1] and Vijay Kulwant[2]

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A rotating valve is designed to be operated by human hands, here we have proposed a robotic hand for operation of the valve in unavoidable circumstances. The arm consists of three degree of freedom linages for movement and one for orientation (Fig. 1). The wrist has one degree of freedom and three under-actuated fingers are placed for adaptive gripping of any object.The arm linkages are actuated by encoded DC motors of 120kgcm torque. The arm has two major linkages of length 60cm and 30cm and a rotating base. These linkages provide a full 360 degree workspace. The whole arm has been mounted on an all-Terrain vehicle which uses rocker bogie mechanism (Fig. 2). The mechanism has been used in mars rovers by NASA. The rocker bogie mechanism keeps the chassis completely stable when traversing through a rocky terrain. It uses six wheels all actuated using DC motors. The mechanism is also useful in climbing up-stairs depending upon the height of the wheel. The grabbing mechanism consists of three fingers oriented at 120 degrees spacing between each. This orientation is helpful for grabbing circular axially symmetric objects. While holding any object our finger transfers its motion from different joints successively so based on same concept we are trying to develop a finger which consists of multiple four bar linkages such that the output of one is input to other. In this finger we will be using only one servo motor which will be fixed at the crank of lowest four bar linkage. When first linkage stops moving the remaining motion of motor will be given to the next four bar linkage and thus using successive transmission of motion gripping will takes place. Constraints in the form of v-springs are provided to transfer the motion between mechanisms of the finger. We started with design of simple finger with two four bar linkages, we analyzed this linkage for function generation such that for given specific angle of input the output link should move by some angle. Then the remaining motion of motor will be transmitted to next four bar link. In this two four bar link system there were two contact point and gripping was good but for increasing the gripping capacity of finger there should be more number of contact points with object hence increasing the friction between them. For increasing the number of contact points we tried to make the finger with three four bar links and one fixed triangular link at the tip this prototype was observed to worked well. Some rubber padding can be used on this finger so to increase the gripping capacity. Now we are trying to design a finger with seven to eight four bar linkages so as to increase its adaptability so that it can grab any contour effectively.

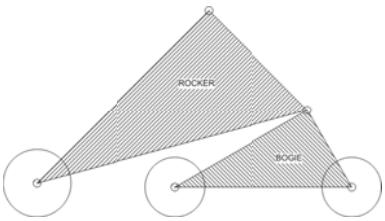

Fig.1. Mobile Manipulator Fig.2. Rocker Bogie Mechanism Fig.3. 3D printed mechanism

Reference

1) F. Barlas, “Design of a Mars Rover Suspension Mechanism”.
2) H. Yang, L. Carlos, V. Rojas, C. Xia, Q. Guo, “Dynamic Rocker-Bogie: A Stability Enhancement for High-Speed Traversal”, International Journal of Robotics and Automation, Vol. 3, No. 3, 2014, pp.212-220.

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COLLEGE OF ENGINEERING

ISMA'15

10th International Symposium on Mechatronics and its Applications
December 8-10, 2015, Sharjah, United Arab Emirates

Call for Papers

ISMA'15 is the tenth of a series of symposia focusing on theoretical and practical aspects of mechatronics. It will be held by the Mechatronics Center at the American University of Sharjah, UAE, December 8-10, 2015. The symposium covers the synergetic integration of mechanical engineering with electronics, intelligent control, and design and manufacturing of industrial products and processes. The main idea of the symposium is to bring together scientists, scholars, engineers and students from universities and industries to exchange and promote research in the field of mechatronics, and hence to foster research relations between the universities and the industry in this field.

Scope of the Conference

Topics of interest include, but are not limited to:

- System Integration: Embedded systems, manufacturing systems, sensors, actuators, modeling and simulation, MEMS and NEMS, bio-mechatronics, autotronics, mechanism design and applications.
- Robotics: Robot kinematics and dynamics, unmanned vehicles, industrial robots, multi robotics, biomedical robotics, telerobotics, microrobotics, navigation, mapping, localization, SLAM, intelligent systems and vision.
- Control Systems: Real-time control, intelligent control, monitoring and supervision, observers, estimation and identification, machine learning and pattern recognition, nonlinear control, robust control, adaptive control, optimal control, digital control, distributed and networked control and control applications.
- Industrial Automation: Electronics, industrial process control, PLC systems, DCS and SCADA.
- Renewable Energy and Sustainable Systems: Mechatronics applications for control and automation of renewable energy, sustainable systems, sustainable production and smart buildings.
- Education: Mechatronics education, virtual labs, e-learning in mechatronics, curriculum development and project-based education.

Prospective participants from all over the world are invited to submit their work using our EDAS online submission system:
https://www.edas.info/newPaper.php?c=19691

The authors should follow the guidelines posted on the symposium website: www.aus.edu/isma15 .

Submitted papers will be peer reviewed. Accepted and presented papers will be published in the proceedings of the ISMA'15 symposium. All accepted and presented papers will be published in IEEE Xplore. Selected papers will be published in a special issue of a reputed journal.

The organizing committee welcomes proposals for special sessions and tutorials to be held in conjunction with ISMA'15. Please send your proposals by email to isma15@aus.edu.

Important Dates

Submission of a draft paper	**June 15, 2015**
Tutorial and special session proposals	**June 15, 2015**
Notification of acceptance	**September 15, 2015**
Camera-ready full paper submission	**October 15, 2015**

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An attractive social program including a visit to the heritage areas, Burj Khalifa tower, museums and shopping centers in Sharjah and Dubai, as well as a half-day desert safari, will be organized.

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Student Poster Competition
A student poster competition will be held during the conference. Prizes will be awarded to the best three posters. Students are invited to submit their research or project work in the area of conference topics.
To enter, submit a two-page paper in two-column format describing the contributions that will be shown in the poster to isma15@aus.edu by September 15, 2015. Accepted students will be notified. Note that papers submitted to the conference do not qualify for the poster competition.

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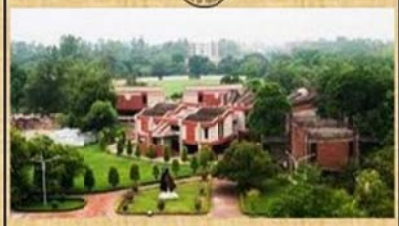
Forthcoming Events

2nd International and 17th National Conference
on
Machines and Mechanisms
(iNaCoMM-15)
December 16-19, 2015
organized by
Department of Mechanical Engineering



IIT Kanpur

Under the aegis of

Association for Machines and Mechanisms

&

IFToMM
International Federation for the Promotion of Mechanism and Machine Science

Introduction

The Department of Mechanical Engineering, IIT Kanpur, under the aegis of the Association for Machines and Mechanisms (AMM), and International Federation for the Promotion of Mechanism and Machine Science (IFToMM) is hosting the 2nd International and 17th National Conference on Machines and Mechanisms (iNaCoMM 2015). The convention will be held on campus during December 16th - 19th, 2015.

Highlights of iNaCoMM-15

iNaCoMM 2015 is the 17th National and 2nd International in the series of biennial conferences on Machines and Mechanisms organized under the aegis of AMM and IFToM. The convention aims at bringng together researchers, industry experts and students, working on various aspects of design and analysis of machines and mechanisms, to deliberate via oral and poster presentations on recent, novel advances.

iNaCoMM 2015 will feature eminent researchers from India and overseas, as plenary speakers. The Conference is planned to commence with an introductory lecture on history and evolution of machines and mechanisms followed by a series of workshops on haptics, static balancing, precision mechanisms, and/or smart material-based mechanisms.

Each day thereafter will commence with a plenary talk by an eminent scientist followed by interesting morning and afternoon presentation/poster sessions on analysis and design of rigid body and compliant mechanisms, advances in biomedical devices, dynamics/control/vibration analysis of multi-body systems (special session) and machines, health monitoring, applications for rural environment and agriculture, mechatronic, micro- and nano- systems, and numerous other topics.

The day will culminate with another plenary lecture followed by soothing, recreational performances by our students from Music, Dance and Dramatics Clubs. Professional and Classical, music and dance nights are also planned.

Numerous industry representatives will also showcase recent technological advances in hardware and software.

Scope

The conference will cover following broad areas, but not limited to

- Agricultural and Industrial Applications
- Analysis and Synthesis of Mechanisms
- Compliant Mechanisms
- Design and Analysis of Biomedical Devices
- Dynamics and Control of Multi-body Systems
- Dynamics and Vibration Analysis in Machines
- Fault Diagnosis and Health Monitoring
- History of Machines and Mechanisms
- Mechanisms and Machines for Rural,
- Mechatronic Systems
- Micro-, Nano-Machines and Mechanisms
- Modeling and Simulation
- Robotics
- Theoretical and Computational Kinematics
- Tribology
- Vehicle Dynamics

Call for Papers

Authors are invited to submit a two-page extended abstract at the conference website

(www.inacomm2015.org)

by **May 1st, 2015**. The official language is English. Acceptance of the abstracts will be communicated by **May, 15th, 2015**. Full paper submissions followed by the camera ready prints in the Conference template are expected by **November 15th, 2015**.

Important Dates

Submission of Abstract	**May 1, 2015**
Acceptance of Abstract	**May 15, 2015**
Submission of Full Paper	**July 1, 2015**
Notification of Decision & reviewer comments.	**Oct. 1, 2015**
Final submission of Camera-Ready Prints addressing of reviewer comments.	**Nov. 15, 2015**
Registration	**Nov. 15, 2015**

(one author must register for inclusion of paper in Conference Proceedings)

Registration Fees

Delegates from	India (INR)	Others (USD)
Full time research scholar	2000	200
Research Organizations	5000	300
Others (Academic Institutions)	7000	450
Concession (IFToMM Members)	500	50

Advisory Committee

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Venugopal, S.	IGCAR, India

Accommodation

On campus accommodation is available on payment basis at IIT Kanpur guest house/student hostels on first cum first served basis.

Organizing Committee

Patron: Director IIT Kanpur

Organizing Chairs

Anupam Saxena
P K Panigrahi (Head, Mechanical Engineering)

Overall Organization

P. Venkitnarayan
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For updates, please visit

www.inacomm15.org

About IIT Kanpur

IIT Kanpur is a mini-academic city, a self sustained, lush green campus spread across 1055 acres hosting about 14, 000 inhabitants. The campus is well-equipped with infrastructure catering to our academic, culinary, residential and recreational requirements. It offers an innate picturesque ambience that is consistently energizing and calming.

IITK experiences all seasons – the scorching heat of the summer, the wet, humid afternoons of the rainy season, and the chilly and hazy nights of the winter. Our hallmark is the presence of peacocks on campus, often lurching on the green grounds or resting on high branches.

Tourism sites in and around Kanpur

India is an experience! A visit to IIT Kanpur comes with a unique advantage of exploring the rich and diverse heritage of Northern India. Kanpur is home to several historical sites, e.g., Bithoor, Ghatampur and Shivrajpur. Visits to the mystic ghats of Varanasi, ancient ruins of Kaushambi, architectural splendor of Khajuraho, clouds touching down in Nainitaal, moonlit Taj and the transcendent beauty of the Himalayas are bound to leave one enriched and craving for more.

2nd International and 17th National Conference on Machines and Mechanisms
iNaCoMM 2015
Dec. 16th - 19th, 2015
Indian Institute of Technology Kanpur

Student Mechanism Design Contest

www.inacomm15.org

Objective:
A key objective is to promote innovation among students. **Students are encouraged to apply theoretical knowledge in the domain of mechanisms and machines to solve problems relevant to the society.**

Award:
The Association of Machines and Mechanisms (AMM) has approved 3 prizes for the Student Mechanism Design Contest. The winning entry will receive 10, 000 INR while the 2nd and 3rd prizes are of 6,000 and 4,000 INR each.

Who can participate?
Participation is restricted to individuals/groups of students (up to three members). ALL registered as full-time students/research scholars/project staff in recognized institutes.

How to participate?
Participants are invited to submit proposals for design, construction and operation of mechanisms which are innovative and capable of solving a challenging design problem. The design problem may be chosen from a wide range of application domains - from agricultural and rural technology to automobile and aerospace engineering. Examples include:

1. A Tree climbing mechanism.
2. Walking mechanism (with two or more legs).
3. Mars-rover type small vehicle which can climb over significant obstacles.
4. Staircase climbing mechanism.
5. Foldable mechanisms, which can be deployed as useful structures, e.g., space-efficient beds, tables and other furniture, etc.
6. An ergonomic device to help crush manually, to prepare road "aggregate" in rural applications.
7. An economical cable way system to transport materials (level and sloping grounds).
8. Ergonomic design for rod-bending machine, commonly used at construction sites.
9. A foot-operated substitute of the hand-pump.
10. Automatic operation of traditional games, such as table tennis return function.

The above listing is only representative. Participants are free to innovate on their own.

Following additional points may also be noted:

1. The mechanism could be manually powered or operated by a small motor or engine.
2. Operational safety of the mechanism/machine and the power source is of utmost importance. Unsafe machines will not be allowed for demonstration.
3. It is suggested that the mechanism be light and compact, and easy to transport, assemble and operate at the venue. Significant modifications/repairs cannot be done at the venue.
4. Machines using significant artificial intelligence (robots) are not allowed. However, some sort of remotecontrol from an operator is allowed.
5. The prototype machine must be operated satisfactorily in front of the judges, and each machine will be given **at most three chances**, to demonstrate its performance.

Procedure and deadlines:

1. Participants must submit a 2-page proposal by October 1st, 2015, outlining the design challenge and novelty/innovation of the proposed design. Submissions should be done through email, with the subject line: Proposal for the Students' Mechanism Design Contest, to the following addresses: anupams@iitk.ac.in, inacomm2015@gmail.com.
2. Decisions will be sent out by October 15, 2015, and participants with promising proposals would be requested to proceed towards developing a working prototype.
3. Participants have to submit details of the prototype by November 10th, 2015, including photographs or video clips. Please e-mail all material as a .zip file attached to an email to anupams@iitk.ac.in,inacomm2015@gmail.com with the subject line **"Update on SMDC entry"**.
4. Reviews of the prototypes will be sent out by November 20th, 2015, and successful participants will be requested to participate in the final round, to demonstrate their working prototypes during iNaCoMM 2015 at IIT Kanpur. Those invited for final presentation will be provided TA/DA.
5. Finished prototypes are to be demonstrated before a panel of judges.
6. Winners will be adjudicated based on the extent of innovation, difficulty of the design challenge, effectiveness of the proposed solution towards solving the actual problem, etc.
7. In any matter related to the contest, decision of the judges and/or the organisers would be final and binding.

28th International Conference on CAD/CAM, Robotics and Factories of the Future 2016

6th – 8th January 2016

http://www.cemkolaghat.org/cadcamconf

The International Society for Productivity Enhancement (ISPE) and College of Engg. & Management, Kolaghat, WB, India are proud to announce the 28th International Conference on CAD/CAM, Robotics and Factories of the Future. The organizing committee is calling all researchers, engineers and scientists around the world to contribute to the conference. Poster submissions are also encouraged reporting on work in progress. Full papers are invited in, but not limited to, the following topics:

A. Product Development and Sustainability
B. Modeling and Simulation
C. Automation, Robotics and Handling Systems
D. Supply Chain Management and Logistics
E. Advanced Quality Systems Tools and Quality Management
F. Advanced Manufacturing Processes
G. Human Aspects in Engineering Activities
H. Emerging Scenarios in Engineering Education and Training
I. Smart Factories

Conference proceedings

Conference proceeding will be published by Springer through double blind review process as per Springer guidelines. Also a few selected and best papers will be again published in several reputed journals such as ***Journal of Computational Design & Engineering (Elsevier), International Journal of Bio-Mechatronics & Biomedical Robotics (Inderscience), International Journal Manufacturing Technology & Management (Inderscience), International Journal of Mechatronics, Electrical and Computer Technology (IJMEC), Universal Scientific Organization, Journal of Mechatronics and Intelligent Manufacturing (Nova science)***

Keynote Speakers

Chief Guest
- Prof. Raj Gill, Middlesex University, UK

Tentative Guest of Honour
- Professor Hrishi Bera,Colombia and South Bank University, UK

Tentative Speakers
- Professor Chanan Syan, University of West Indies
- Professor Andrew Yeh-Ching NEE, National University, Singapore
- Dr. Brian Prasad, Technical Director, Knowledge Solutions, Irvine, CA, USA
- Prof. Ashitava Ghosal, IISc, Bangalore
- Prof. Ashish Dutta, IITK

Tentative Speakers
- Dr. D. N. Badodkar, BARC, Mumbai
- Dr. Prabir K Pal, DRHR, BARC, Mumbai
- Dr. Subir Kumar Saha, IITD
- Dr. Debanik Roy, BARC, DAE, Mumbai
- Dr. Pradeep Kumar, VSSC, Thiruvananthapuram

Conference Chair

Prof Dipak Kumar Mandal
College of Engineering and Management,
Kolaghat, P.O. KTPP Township,
Purba Medinipur, West Bengal- 721171
Email: dipkuma@yahoo.com, dkm@cemk.ac.in

MTM & Robotics 2016

The Joint International Conference of the XIII International Conference on Mechanisms and Mechanical Transmissions (MTM) and the International Conference on Robotics (Robotics'16)

Aachen, Germany, October 26th -27th, 2016

Organized by

Department of Mechanism Theory and Dynamics of Machines (IGM) at RWTH Aachen University and Department of Mechatronics at University Politehnica Timisoara (UPT)

Under the Patronage of IFTOMM

International Federation for the Promotion of Mechanism and Machine Science
Technical Committee for Linkages and Mechanical Controls

Conference Chairman

Burkhard Corves (Germany)

Conference Co-Chairmen

Erwin-Christian Lovasz (Romania)
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With the support of

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Iulian Tabără (Romania)
Yukio Takeda (Japan)
Radu Ţarcă (Romania)
Hidetsugu Terada (Japan)
Ioan Vela (Romania)
Ion Vişa (Romania)
Yao Yan-An (China)

Organising Committee

Claudia Comely — Stefan Kurtenbach
Iosif Cărăbaş — Valentin Ciupe
Corina Gruescu — Cristian Moldovan
Dan Mărgineanu

Aim

The aim of the joint conference is to bring together researchers, scientists, industry experts and PhD students to provide a general forum for researchers, engineers and PhD students involved in the general area of mechanisms, mechanical transmissions, robotics and mechatronics, to disseminate their latest research results and exchange views on the future research directions of these fields.

Topics

We are looking for original, high-quality contributions addressing (but not limited to) the following topics:

MTM

Mechanisms – analysis and synthesis
Dynamics of mechanisms and machines
Mechanical Transmissions, Biomechanics,
Precision mechanics, Mechatronics,
Micromechanisms and Microactuators
Computational and Experimental Methods
CAD in mechanism and machine design

Robotics

Mechanical design of robot architecture
Parallel robots, Mobile robots
Micro and Nano robots
Sensors and actuators in robotics
Inteligent control systems
Biomedical engineering
Teleoperation, haptics, virtual reality

Submission, presentation and publication

The official language of the joint conference is English. Each paper will be reviewed, and the papers selected by the Scientific Committee will be published in the periodical "Applied Mechanics and Materials" available in full text online at www.scientific.net indexed by ISI Web of Knowledge and monitored by all major abstract media. All submitted papers must be strictly prepared following the publication guidelines. For detailed up-to-date information, please visit the MMT&ROBOTICS'2016 conference website.

Deadlines

Full paper submission:	March 1st, 2016
Prov. accept. notification:	May 15th, 2016
Final paper submission:	June 1st, 2016
Final accept. notification:	June 10th, 2016

Registration

"Early Bird" Registration (before June 15th, 2016)	
IFToMM Members	300 €
Non IFToMM Members	450 €
Regular Registration	
IFToMM Members	500 €
Non IFToMM Members	650 €
Students/Accompanying Persons	250 €
Excursion, October 28th 2016	100 €

Venue

The conference will be held at RWTH Aachen University in Germany. Aachen is the western-most city of Germany close to Belgium and the Netherlands. It was already inhabited by Romans and has a spa tradition from that time on. It is easily accessible from countries by plane, train or car (see website).

Accommodation

Aachen provides accommodation in several hotels of different categories. A list of hotels will be available on the website of the conference.

Excursion

Directly after the conference there will be an excursion day with both touristic and technical focus in regional character.

Further Information

This is the first call for papers intended to inform about the aim, topics and important dates of the workshop. Detailed information about venue, accommodation, social program and other topics will be published on the website.

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