Association for Machines and Mechanisms News Bulletin

Volume 8, No. 3 July 2016

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

Volume 8, No. 3, July 2016 issue of the Bulletin of the Association of Machines and Mechanisms (AMM) is being published within this rainy season while the Independence Day of India is knocking at the door. As the Zonal Vice President (East) is out of station, the Editor-in-Chief has to take the responsibility to bring out this issue.

Dr. G. Sarvana Kumar, the Secretary, Dr. C. Amarnath, the President and other office bearers of the AMM have cooperated as usual to bring out this issue.

One article on "3D Printing" written by Dr. G. Sarvana Kumar is published in this issue. Also the report of the 3rd National Workshop on Advances in Robotics is included in this issue along with the announcements of different events around the globe with the Call to participate in the respective programme. Hope these would be of interest to the Machines and Mechanisms community.

The congratulatory note of achieving an Award by the Team of IIT Bombay is happily placed within issue by the Secretary, AMM.

I earnestly request AMM members to contribute articles for the November 2016 issue. Constructive suggestions, comments for improvement of the Bulletin of the AMM that can be published as a separate regular column, are also requested.

I wish to express my sincere gratitude to all concerned for their help to bring out this issue of the Bulletin.

I again urge the members of the AMM to think whether an International Journal of the AMM can be thought of in near future to promote the activity of Machines and Mechanisms community further.

Prof. Santanu Das
Editor–in–Chief

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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"… the only purpose of science is to ease the hardship of human existence."

--- B. Brecht
(From : The Life of Galileo)

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 (2008-2011 and 2016-2019). Yoshiko Nakamura (2012-2015)

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
- **5 affiliated Journals and 2 book series:**

Mechanism and Machine Theory
http://www.journals.elsevier.com/mechanism-and-machine-theory/
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.tyi-in.com/
Mechanics Based Design of Structures and Machines
http://www.tandf.co.uk/journals/titles/15397734.asp

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, January 2016

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.

EC 2016-2019

President: Marco Ceccarelli (Italy); Vice-President: Chang Shuo-Hung (China-Taipei); Secretary General: Zielinska Teresa (Poland); Treasurer: Carretero Juan Antonio (Canada); Past President:Yoshihko Nakamura (Japan); EC members: Corves Burkhard (Germany), Ghosal Ashitava (India), Huang Tian (China- Beijing), Merlet Jean Pierre (France), Viadero Fernando (Spain), Can Dede (Turkey)

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

ARMENIA
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AUSTRIA
AZERBAIJAN
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BRAZIL
BULGARIA
CANADA
CHINA-BEIJING
CHINA-TAIPEI
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SERBIA
SINGAPORE
SLOVAKIA
SLOVENIA
SPAIN
SWITZERLAND
TUNISIA
TURKEY
UKRAINE
UNITED KINGDOM
USA
VIETNAM

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)
- Workshop on Medical and Service Robots(MESROB)
- Summer Schools

Conferences under IFToMM patronage (a 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

IFToMM, January 2016

Congratulations!!

We are happy to note that the Dr. P. K. Patwardhan Technology Development Award for the year 2015 is conferred upon the following technology development effort :

'A Remotely Operated Ground Vehicle (Rover) for Indian Army'

by Prof. Anirban Guha and team of the Department of Mechanical Engineering, IIT Bombay.

This is based on the recommendations of the Award Committee. The award carries a citation and a cash incentive of Rs. 25,000/- and will be presented during the Teachers' Day function scheduled to be held at IIT Bombay during September, 2016.

The Team consists of Prof. Anirban Guha, Prof. C. Amarnath, Prof. B. Seth, Prof. K. Kurien Issac and Mr. Abhay Kharade (Project Staff).

The Secretary,
Association of Machines and Mechanisms

3D Printers

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Abstract: Arising as a new manufacturing technology, additive manufacturing (AM) or 3D printing has caught the attention of every engineering discipline from automotive to biomedical engineering. These systems are based on a layered manufacturing technique where a 3D CAD model of the object is decomposed into cross-sectional layer representation and built in an automated fabrication machine to form physical objects. This article briefs some aspects of AM, along with some details to building a 3D printer based on open source hardware and software.

1. Introduction to 3D Printing Process

3D printing allows to quickly fabricate complex-shaped, three-dimensional parts directly from CAD models. This means that the designers have the choice of making from concept design a physical model for viewing, studying and testing as well as for manufacturing. It involves slicing the CAD model of an object into thin slices, which can be fabricated by using many solid free form manufacturing process. The advantages of these manufacturing process is that they build complex 3D objects based on automatic process planning from CAD models, use generic machines that do not need part specific fixtures or tools and require no or minimum human intervention. Unlike CNC machines, which remove material to obtain a desired shape, 3D printing systems are additive in nature. Implementation of this layered manufacturing for modern manufacturing has been realized due to the development of many technologies, including CAD, laser material processing, printing, precision motion controllers along with some traditional technologies like powder metallurgy, welding, CNC machining and lithography.

Approximately three decades ago, the art of building 3D objects by layers was significantly advanced by 3D Systems Inc., a US based company [1] based on the concept of realizing 3D shapes by photo curing polymers using lasers also popularly known as Stereo-Lithography. Today many other systems are available that build layered objects by lamination of sheet material (Helisys [2]), binding powders (DTM [3] and EOS [4]) or extrusion of thermoplastics (Stratasys [5]) to name a few. The availability of vast number of patented process has ensured that many materials can be processed providing designers with alternatives to realize physical prototypes and end use parts. Recent advances in selective laser melting using laser and electron beam as power sources has enabled printing production grade metallic components for end use application in aerospace, biomedical and automotive applications [4,6].

2. Process Sequence of 3D Printing

The 3D printing process essentially starts with the creation of a computer model of the object and ends with the realization of physical prototype of the object. The complete process can be sequenced into sub process and are further enumerated and described briefly (illustration in figure 1).

Geometric Modeling: Creating an accurate and complete solid model is a general prerequisite of 3D printing process. The solid model should be watertight. There are several commercial solid-modeling packages available for developing solid models. Geometric models can also be constructed from Computed Tomography (CT), Magnetic Resonance Imaging (MRI), reverse engineering, etc., depending upon the need.

Data Conversion and Checking: Geometric data of a model is transferred from a CAD system to a 3D printing system primarily through the STL (Stereo-Lithography) file format. This format has become a *de facto* standard for interfacing with AM systems. The solid model is converted into an STL format. The STL is a faceted format and consists of connected three-dimensional triangles representing the part shape. The vertices of the triangle are ordered to indicate which side of the triangle contains the part mass. The translation from CAD to AM results in loss of accuracy as well as prone to errors. The typical errors are flipped normal, mid-line node closure errors (holes) and truncation errors. The validity of STL file is verified using some commercial correction software and the file is repaired.

Part Building: This process starts with placing the STL file for the optimum part orientation, and extracting the slice information from it, checking the slices for any open curves and other defects and repairing them, adding the part-building parameters, if any, and sending the file to the AM machine. The machine then builds the part described by the file, and this process requires no or minimal human intervention.

Post-processing: In the post-processing stage, some skilled manual operations are performed. These operations include removal of supports and excess material, if any, and post-curing, if required.

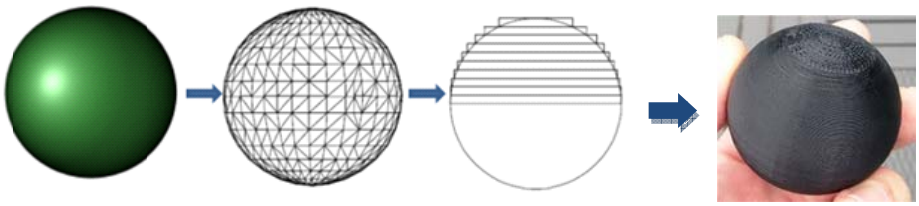

Figure 1 Schematic of 3D printing process chain

3. RepRap: Open Source 3D Printer

Fused deposition modelling (FDM) technology was developed and implemented by Stratasys Ltd. [5] in 1990s. FDM builds parts with production-grade thermoplastics, so things printed are of excellent mechanical, thermal and chemical qualities. 3D printing machines that use FDM Technology build objects layer by layer from the very bottom up by heating and extruding thermoplastic filament. RepRap was the first of the low-cost 3D printers based on this technology, and the RepRap project started the open-source 3D printer revolution. It has become the most widely-used 3D printer among the global members of the Maker Community. Since many parts of RepRap are made from plastic and RepRap prints those parts, RepRap self-replicates by making a kit of itself. A complete documentation of hardware, assembly instruction, printing parts is available from RepRap wiki [7] and illustrated in figure 3. The hardware consists of electronics, mechanical assembly and extruder. The mechanical assembly consists of the support frame, *x*, *y* and *z* drive axis and print bed. The electronics constitutes of Arduino controller, stepper motors (three to drive *x*, *y* and *z* axis and one for extruder), limit switches and heating for the print platform. The extruder is responsible for feeding filament through a nozzle and melting it as it's deposited onto the bed where the part is made. There are several open source STL to G-code converters

available that can be used with RepRap, as an example Cura [8]. With open source CAD tools like FreeCAD [9], it has become possible for everyone to have access to 3D modeling to printing physical parts.

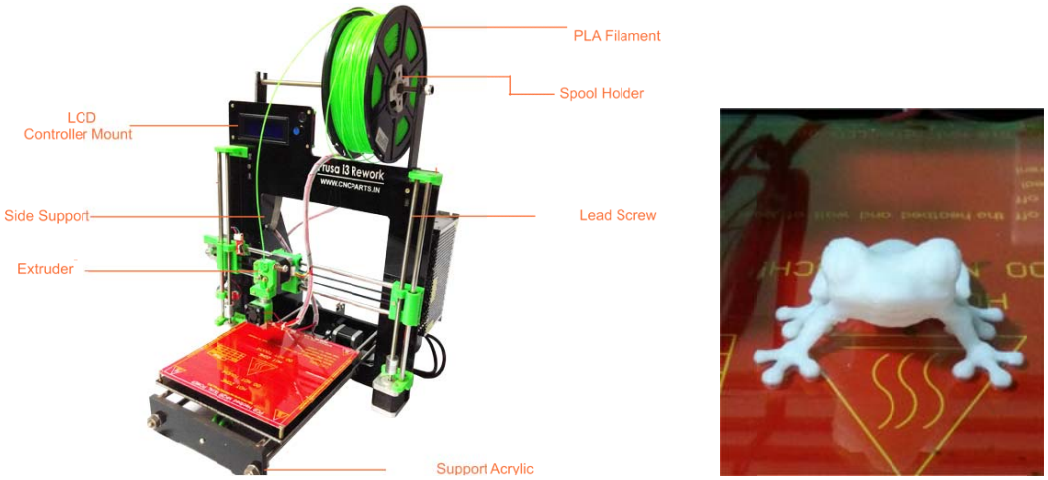

Figure 2 A RepRap printer assembled using Pursa i3 Rework parts [6] along with a sample printed part.

References

[1] 3D Systems. USA. http://www.3dsystems.com/
[2] Helisys Inc., http://www.helisys.com
[3] DTM Corporation. http://www.dtm-corp/
[4] EOS GmbH. http://www.eos.info/
[5] Stratasys Inc., http://www.stratasys.com
[6] Arcam AB, http://www.arcam.com/
[7] RepRap, http://reprap.org/wiki/RepRap
[8] Ultimaker Cura Software, http://software.ultimaker.com/
[9] FreeCAD, http://www.freecadweb.org/

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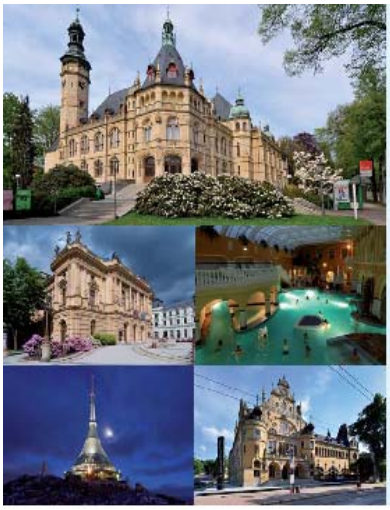
Report on the 3rd National Workshop on Advances in Robotics

The 3rd National Workshop on Advances in Robotics, organized by IIT Madras and Robotics Society of India (RSI) was held at IIT Madras on 18th and 19th July 2016. The workshop was inaugurated by Prof. Ashok Kumar Mishra, Dean (academic Research), IIT Madras on 18th July 2016. Resource persons included eminent faculty from IIT Delhi, IIT Kanpur, IIT Roorkee, IIT Madras, IIT Jodhpur, IISc., Texas (A&M) University, scientists from R&D Engineers (DRDO), and experts from private industries. Keynote lectures were delivered by Prof. Ashitava Ghosal (IISc., Bangalore)and Mr. Alok Mukherjee (R&D Engineers, Pune). The topics covered during the two days of the workshop included kinematics of manipulators, robotic vision and applications, autonomous systems, soft robotics, mobile robotics, motion planning, visual servoing, and reinforcement learning.

More than 60 participants attended the workshop. Participants included faculty from academic institutes, engineers from industry, scientists from R&D establishments, and graduate students from various institutes. The workshop was sponsored by Defence Research and Development Organisation, New Delhi.

Forthcoming Events



TECHNICAL UNIVERSITY OF LIBEREC
Faculty of Mechanical Engineering

History of Liberec

Its history goes back to the time when trade routes to Germany and Poland led through the location. As traders found crossing Ještědský hřeben too hard, it was necessary to set up a resting place. At that time Liberec used to be an open market village. The first notes on a town date back to 1352. In the first half of the 16th century it gradually changed into a vassal town. Liberec used to be the second biggest town in Bohemia. There were 3 consulates, 50 textile factories and 60 metalworking factories.
Nowadays Liberec offers various tourist attractions. The city boasts of numerous important buildings, such as the City Hall, F. X. Šalda Theatre, Museum of Northern Bohemia, Ještěd Viewing Tower, Babylon Leisure Centre and other cultural and historical sights. Liberec is also an ideal place for walks or hiking tours in its environs or in the Jizerské hory. Liberec is less than 1 hour from Prague...

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XII. International Conference on the Theory of Machines and Mechanisms

September 6–8, 2016
Liberec, Czech Republic

IFToMM

The International Federation for the Theory of Machines and Mechanisms

General Information

By accreditation from the Czech National Committee IFToMM, the Technical University of Liberec organizes the XII. International Conference on the Theory of Machines and Mechanisms. The conference which is held every four years, continues its long standing tradition since 1973 to be organized at the Technical University of Liberec in the Czech Republic.

The Organizing Committee aims at bringing together specialists, working on issues related to the theory of machines and mechanisms from a general as well as a precise application point of view.

Topics of the Conference

Accompanying Events:

Social Programme:

The Conference Fee

Participants	400 €
Students	300 €

The conference fee includes one copy of book of proceedings, coffee breaks, conference banquet, lunches, social programme, bank costs and administration charges.

Accompanying Person	125 €

The conference fee includes coffee breaks, conference banquet, lunches and social programme

Collaboration:

Scientific Steering Committee

Important Dates:

March 7, 2016

March 9, 2016

April 18, 2016

May 9, 2016

May 21, 2016

Publication

CONFERENCE FEE

1750zł -cost of participation
1350 zł - fee for PhD student
850 zł - fee for accompanying person

Author or co-author cannot be treated as an accompanying person.
The conference fee includes: accommodation, food, conference materials and accompanying events.

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25th INTERNATIONAL CONFERENCE ON THEORY OF MACHINES AND MECHATRONIC SYSTEMS

NOWY SĄCZ / RYTRO
SEPTEMBER 18 – 21, 2016

ANNOUNCEMENT No 1

The remains of the castle from XIVth century situated in Rytro

ORGANIZED BY

Institute of Engineering of
The State Higher Vocational School in Nowy Sącz

Polish Committee of Theory of Machines and Mechanisms

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and

Mariusz Cygnar, Ph.D.,D.Sc
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kindly invite to participate in the Jubilee

25th

International Conference on Theory of Machines and Mechatronic Systems

on

September 18 – 21, 2016

Accomodation:

Hotel "Perła Południa", Rytro
33 – 343 Rytro 380 Poland
http://www.perlapoludnia.pl

IMPORTANT DATES

30.04.2016 - Registration and abstract
15.05.2016 - Conference fee
31.05.2016 - Full paper submission

Conference fee should be transferred to:
Państwowa Wyższa Szkoła Zawodowa
w Nowym Sączu
ul. Staszica 1, 33-300 Nowy Sącz
NIP: 734-25-59-820
Bank: PKO SA oddz. Nowy Sącz
ul. Jagiellońska 26,33-300 Nowy Sącz
Nr konta: 84 1240 4748 1111 0010 4341 0034
Bank transfer title: "TMM2016 Last name"

Publication of the papers:
Acta Mechanica et Automatica,
Archive of Mechanical Engineering,
International Journal of Applied Mechanics and Engineering.

CONFERENCE TOPICS

- Structure, kinematics and dynamics of mechanisms and machines,
- Synthesis of mechatronic systems,
- Modeling and simulation of mechatronic systems
- Driver and machine controls,
- Dynamics, driver and machine control,
- Mechatronic systems,
- Robots and manipulator systems,
- Biomedical engineering,
- Application of graphs in the theory of machines and mechanisms,
- Ergonomics and systems man – machine,
- Contemporary trends in teaching in the theory of machines, mechanisms and mechatronics,
- History of mechanisms and machine science.

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Wiesław ŻYLSKI

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,
RWTH Aachen University
and
University and Department of Mechatronics,
University Politehnica Timisoara (UPT)

With support of:
IFToMM Germany
Romanian Association for Theory of Machines and Mechanisms
Robotics Society of Romania

Website: http://www.mtm-robotics-2016.igm.rwth-aachen.de/

Conference 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,
  - Intelligent control systems
  - Biomedical engineering
  - Teleoperation, haptics, virtual reality

Introduction

The Indian Institute of Technology Madras, in association with the Science and Engineering Research Board (SERB) of the Department of Science and Technology, Govt. of India, is organizing the 2nd SERB School on Robotics at IIT Madras from 14th to 19th November, 2016. Robotics being a rapidly growing field, research, design, and development of new applications play a vital role in taking the Indian industry to new heights. The objective of the workshop is to provide the participants a comprehensive coverage of the theory and practice in the area of robotics, to prepare them to take up advanced research in the field of robotics.

Eligibility

Engineering faculty from colleges all over the country, including CFTI, can participate. Few seats will be available to research students working in the area of robotics.

Number of participants will be restricted to 45. Thirty seats will be for faculty/students from engineering colleges, 10 for scientists from R&D labs and 5 for engineers from industry.

Course Content

Theory related to Robotics:

- Linear Algebra & Spatial Transformation Principles
- Nonlinear Dynamics
- Stochastic Processes
- Control Theory
- Sensing and Perception
- Machine Learning, and Planning

(All with reference to robotics)

Applied Robotics:

- Dynamics and Control of Industrial Robots
- Actuators and Controllers- Selection and Integration
- Human-centred Robotics and Applications
- Guidance, Navigation and Control of Autonomous Robots
- Emerging Robot Applications- Medical, Aerial, Underwater etc.

Faculty

Core faculty will be selected from top Indian academic institutions and research centers. List of faculty will be made available in the website.

Course fee & payment procedure

The registration fee for the candidates from Govt. Institutes/ Universities/R&D laboratories will be nil, whereas Rs. 2000/- will be charged as seat booking fee, which will be returned along with the TA reimbursement (maximum 2-AC train fare for the shortest route) after successful completion of the course. The registration fee for candidates from private universities and industries will be Rs. 10,000/-. The registration fee includes the registration, course material and boarding and lodging for the entire duration of the school. The accommodation will be provided to the participants only, in the institute guest house, in twin sharing mode, on the first-come-first-served basis, subject to availability. The fee is to be paid in the form of demand draft drawn in favour of IIT Madras.

Online registrations will be open from 15th August 2016.

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XII IPRoMM

National Workshop on

INDUSTRIAL PROBLEMS ON MACHINES & MECHANISMS:
"Challenges in Manufacturing"

Organised by
Department of Mechanical Engineering
Visvesvaraya National Institute of Technology, Nagpur

under the aegis of
Association of Machines & Mechanisms

December 22-23, 2016

ABOUT WORKSHOP

IPRoMM essentially concentrates on industrial problems and practical solutions to the design of machines in specific areas. The workshops held so far had covered textile, mechanical handling, agricultural machinery, home appliances and precision instruments and micro-mechanisms. The 11th IPRoMM covered CAD Simulation in Automobile and Allied Industry. The main purpose of organizing this workshop is to bring engineers from industry and academia together on a single platform. It will also provide an opportunity to the researchers to share the on-going research with industry persons through paper presentations. This workshop will give impetus to researchers and help them in handling problems related to manufacturing. At the same time it will be an opportunity for the students to interact with industry persons and get involved in some real life problems and their solution. This will facilitate sharing of knowledge related to design & manufacturing between industry & academia.

SCOPE OF THE WORKSHOP

The workshop broadly covers following topics:

- Layered Manufacturing / Advanced Manufacturing
- CAD/CAM/CNC
- Biomedical Engineering
- Aerospace Technology
- Unconventional Energy
- Robotics and Automation
- Fluid Machines
- Mechatronics
- Materials Engineering : Nano materials and composites
- Basic Mechanical Designs
- Design of Mechanisms & Machines

ABOUT VNIT AND NAGPUR

Visvesvaraya National Institute of Technology, Nagpur is one of the oldest among thirty one National Institutes of Technology in the country. VNIT Nagpur is a premier technological institute of central India situated in lush green campus of 220 acres. The campus is well equipped with infrastructure catering to our academic, research, culinary, residential and recreational necessities. Nagpur is pleasant and calm during December. Distance of VNIT campus from airport is 7.5 km and that from railway station is 6 km. VNIT campus is easily accessible through auto or taxi.

INSTRUCTIONS FOR AUTHORS

Scientist and Researchers are invited to submit one page abstract of their original work within the scope of the workshop at the workshop website (www.ipromm2016.org). The abstract should be typed using MS-WORD within the area of 150mm*220mm of an A4 size paper in single spacing with Times New Roman 12 point and should include the title of the paper, names of the authors with full affiliation and e-mail id of the corresponding author. Intimation of acceptance of abstract will be communicated to corresponding author. Authors will have to submit full length camera ready paper for double blind review. Authors of accepted paper will be asked for oral or poster presentation.

Best paper award may be given in different categories.

IMPORTANT DATES

Submission of abstract :	30th June 2016
Acceptance of Abstract :	10th July 2016
Submission of Full Paper :	31st August 2016
Acceptance of Paper:	10th October 2016

Submission of Camera Ready Paper: 25th October 2016
Registration : 1st December 2016

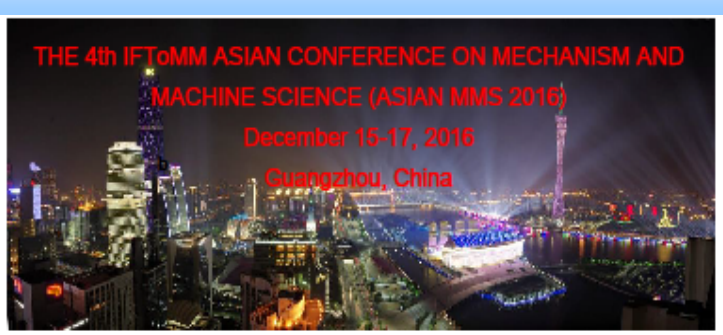
REGISTRATION

Research Scholars (Student Category)	: Rs. 1500/-
AMM Members	: Rs. 3000/-
Non AMM Members	: Rs. 4000/-
Industry Participant	: Rs. 6000/-

SOUVENIR AND EXHIBITION

A souvenir containing the technical program, invited talks and, abstracts of contributed papers and information about AMM events and other sponsoring bodies, would be published on this occasion. An exhibition shall be arranged for displaying products and equipments. Manufacturers and Suppliers who would like to exhibit/ advertise their products and equipment may please contact Organizers for further details.

For regular updates please visit:
www.vnit.ac.in
www.ipromm2016.org



http://www.ccmms-asianmms.org
Email: mms2016@scut.edu.cn

Aiming at enhancing cross communication among researchers, industry professionals and students from Asian countries from the broad ranges of disciplines referring to mechanism and machine science, in 2010 the first IFToMM Asian Conference on Mechanism and Machine Science was held in Taipei. In 2012 the second conference was held in Tokyo. In 2014, the third conference was held in Tianjin. In 2016, the fourth conference will be held on December 15-17, Guangzhou, China, China to continue with the spirit of this wonderful event in Asian region.

Conference Objectives:

In this conference, issues related to mechanism and machine science including their theory, application, analysis, design, elements, systems, history, and education for the society will be discussed. Topics of interests include, but are not limited to

(1)Theoretical kinematics
(2)Computational kinematics
(3)Machine elements
(4)Actuators
(5)Gearing and transmissions
(6)Linkages and cams
(7)Mechanism design
(8)Dynamics of machinery
(9)Tribology
(10)Vehicle mechanisms, dynamics and design
(11)Reliability
(12)Experimental method in mechanisms
(13)Robotics and mechatronics
(14)Biomechanics
(15)Micro/nano mechanisms and machines
(16)Medical/welfare devices
(17)Nature and machines
(18)Design methodology
(19)History of mechanism and machine science
(20)Education in mechanism and machine science
(21)Reconfigurable mechanisms and reconfigurable manipulators
(22) Origami mechanisms

Important Dates:

Submission of Full Paper & Invited Session Papers	**July 30, 2016**
Notification of Acceptance for Papers	**August 5, 2016**
Submission of Final Papers	**August 10, 2016**

IFToMM CMES NSFC

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