

# ASSOCIATION FOR MACHINES AND MECHANISMS NEWS BULLETIN

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## 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 and National Conference on Machines and Mechanisms, iNaCoMM, and the workshops on Industrial Problems on Machines and Mechanisms, IPRoMM regularly.

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Contact Details  
Prof. P M Pathak  
Secretary, AMM



## Message from the Editor-in-Chief

In the year 2020, this is the first issue; it was supposed to be published in the month of January 2020. The present Office Bearers are thankful for the active support of all members to bring out this issue of the Bulletin of the AMM. The Proceedings of the iNaCoMM 2019 is included in this issue. Dr. Rajeev Kumar, Associate Professor, IIT Mandi is acknowledged for contributing the same.

I am sorry for the delay in bringing the present issue to all. The present situation has made it more difficult for us all, however human kind has always overcome such critical condition and we will be surely out of this crisis soon.

The question however remains as to how much we are going to pay for our deeds before this all ends. We need to look closely upon our past deeds and realise what all needs to be changed and how the framework of the system should be regulated to ensure that any such outbreak should be handled smoothly in future. The only way to counter such situation is to accelerate research and development towards effective and fit-for-purpose tools and equipment guided by latest technologies. The tools that enable us to understand the social impact of the pandemic, could also help us to build the world we will need, after it has passed so that we can assure to combat such outbreaks decisively in near future. The onus is also on us academicians and we need to be ready to take the responsibilities.

To make the newsletter more worthy, I request all AMM members and others to contribute articles and technical briefs in forthcoming issues.

I would like to end my message by quoting the lines of Our Nobel Laureate, Kaviguru Rabindranath Tagore "Faith is the bird that feels the light when the dawn is still dark".

April 2020

Prof. S. Sanyal  
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. 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](http://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 decentralize the AMM official activities and to organize workshops under the aegis of AMM to popularize 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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**Mechanical rules are never a substitute for clarity of thought**

*Brian Kernighan*

## Report on iNaCoMM2019

4th International & 19th National Conference on Machines and Mechanisms (iNaCoMM 2019) was organised under the aegis of Association for Machines and Mechanisms (AMM) and International Federation for the Promotion of Mechanism and Machine Science (IFTOMM) at IIT Mandi during Decemner 5-7, 2019. The conference aims at bringing together researchers, industry experts and students interested in various aspects of design and analysis of machines and mechanisms. The conference consisted of plenary session, regular paper and poster presentations, special talks by experts and students' mechanism design contest. iNaCoMM 2019 received overwhelming response from authors. 302 extended abstracts were received; finally 171 papers were selected and registered. Out of 171, 159 papers were selected for oral presentation and 12 were selected for poster presentation. The papers cover a wide range of topics such Mechanisms and Machines for Rural, Agricultural and Industrial Applications, Robotics and automation, standard for robotics and automation, Space mechanism and Tribology, Mechanism for deep sea exploration, CAD and other related subjects, Gear, Cams and power transmission systems, Control of machines, Vibration of Machines & Rotor dynamics, Condition monitoring and failure analysis, Fault diagnosis and health monitoring, Surface treatments for mechanical components, Man – Machine System, Mechatronics and Micro–Mechanisms, Adaptronics, Biomedical Engineering, Acoustic & Noise, Sustainable energy systems, Mechanism for non-conventional energy sources, Composite and advanced materials. Each paper was subjected to three blind reviews. All papers have been thoroughly checked for plagiarism using Turnitin. The organising committee has decided not to accept any paper with more than 20% similarity index. The conference includes plenary session on space technology.

Three days international conference was inaugurated by Dr. Tessy Thomas (Chief Guest), Director General, Aeronautical Systems, DRDO, Shri. Jayanat Patil (Guest of Honor), whole time Director, (Defence), Member of the board L & T Ltd., Prof. B. D Chaudhary, Director (I/c), IIT Mandi, Prof C. Amaranth, President AMM, and Prof S. C. Jain, Chairman, iNaCoMM2019.



Inaugural Address by Dr Tessy Thomas, also known as 'Missile Woman' of India, the first woman scientist to head a missile project in India

In her inaugural address, Dr Tessy Thomas, DG, DRDO and Chief Guest of this session, said that today we are enjoying our life because of already invented concepts and developed machines. She elaborated upon typical systems that consists of many mechanisms. For example, missile and aircraft have many mechanisms. The mechanisms should be properly assembled for proper operations. She also shared the contributions of DRDO in the field of robotics, mechanisms and latest technologies.

DRDO is working in the field of intelligence unmanned system, computer vision processing and artificial intelligence. DRDO has developed various multipurpose machines including industrial great capability robot and futuristic research oriented robotic platforms. DRDO has also developed robot for non-destructive testing of light combat aircraft. Robot for inspection of steam generated tubes of power plant. 3D printing for elastomers, smart materials for missile mimicry and self-healing, hydraulic amplify actuators are developed. She said that Industry 4.0 is the 4th industry revolution with current trend of automation and data exchange, which includes cyber physical system, IoT, cloud computing, and cognitive computing. Today's world of digitalization and networking is the prime aspect with artificial intelligence, the use of advance materials for manufacturing with shared information through IoT, and additive manufacturing of the system will give a new level of intelligence and sensing to the machines.

Next generation of machines would not be metallic. Instead it would be made of soft materials with a wide range of motion that react to apply electricity and will be able to adopt the dynamic environment and will be well suited to work closely with the human. These soft devices will perform a variety of task such as grasping delicate objects, to lift heavy materials, which are 200 times than its own weights. In the end, she mentioned that this conference will create a forum for researchers to find solutions related to human advancements.

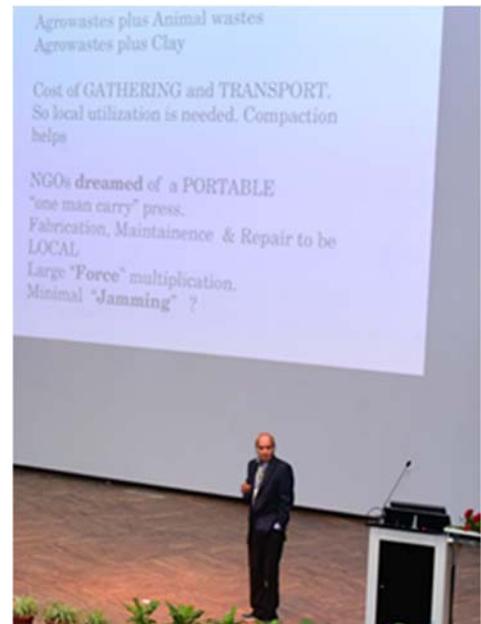
Shri Jayanat Patil, the Guest of Honor, stated that reliability of machine is very important. Machine should be intelligent enough. It should never fail. In development of advanced technology, a good student plays a significant role. A good student is one who actually absolves absolutely and perfectly. Most of the time, a good student does not know about his /her capability but a good teacher can easily see the capability of the student.

Prof C. Amaranth introduced iNaCoMM and emphasized on the importance of collaboration between academia and industry. Dr Rajeev Kumar outlined the detail program of iNaCoMM2019.

Around 250 delegates attended the conference. Seven keynote lectures were delivered by eminent experts, Dr. Subir Kumar Saha, Professor, IIT Delhi, Dr. Chitta Amarnath, Emeritus Professor, IIT Bombay, Dr. Sambit Bhattacharya, Professor, Fayetteville State University, USA, Prof. Guirong Liu, Director, University of Cincinnati, USA, Dr. G. K. Ananthasuresh, Professor IISc Bangalore, Dr. Lalit Singh, Scientist, NPCIL, DAE, Govt of India and Shri A. C. Mathur, former Group Director, Antenna Systems Mechanical Group Space Applications Centre, ISRO, Ahmedabad.



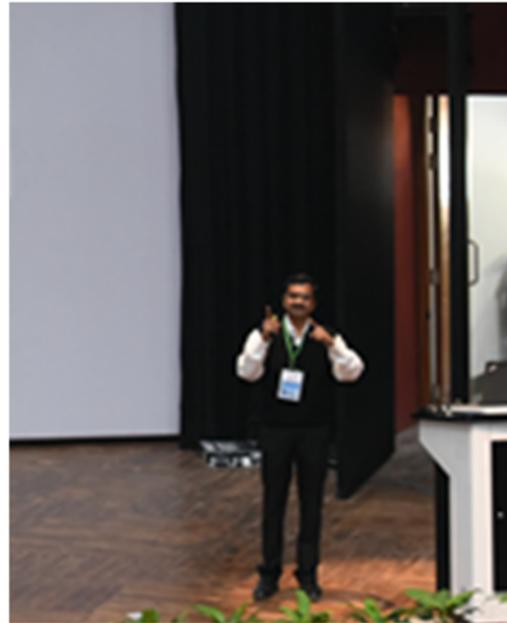
Dr Subir Kumar Saha, Professor, IIT Delhi during his keynote talk on Robotics to Rural -Innovative Teaching and Research Approaches



Dr. C. Amarnath, Emeritus Professor, IIT Bombay and president AMM during his keynote talk on Thought Experiments as a prelude to Design.



Prof. Guirong Liu, Director, University of Cincinnati, USA during his keynote talk on FEM-AI and AI-AI



Dr. G. K. Ananthasuresh, Professor IISc Bangalore during his keynote talk on Analytical Synthesis of Mechanisms



Shri A. C. Mathur, former Group Director, Antenna Systems Mechanical Group Space Applications Centre, ISRO, Ahmedabad during his keynote talk on Space Mechanisms



Dr. Lalit Singh, Scientist, NPCIL, DAE, Govt of India during his keynote talk on Reliability Analysis of Safety critical systems

A plenary session on ISRO activities was also conducted. The plenary session was aimed to carry out space related research and hardware development related activities in India and make the country world leader in short span of time. Three talks were delivered during the session by the experts, Shri Sudheer Kumar N, Associate Director, CBPO, ISRO; Commodore Mukesh Bhargava (Retd), Vice President, Member of the Board, L&T Defence, and Dr. Y V N Krishna Murthy, Registrar - IIST, Former Director - NRSC, Former Scientific Secretary ISRO.



Plenary Session: (from left to right) Dr. Vishal Singh Chauhan, Shri Sudheer Kumar N, Commodore Mukesh Bhargava (Retd), Dr. Y V N Krishna Murthy

A Student Mechanism Design Contest (SMDC) was organised to promote innovation among the students and encourage them to apply their knowledge in the domain of mechanisms and machines to solve problems relevant to society. Eight teams with 17 participants attended the final design contest from various reputed institutes across the country.



Prof. C. Amaranth, Prof. G. K. Ananthasuresh , Dr Arpan Gupta, Shri J. K. Agarwal and Shri A.C. Mathur during SMDC

The major attraction of the conference was the ISRO- exhibition apart from the keynote talks, technical sessions, and student's mechanism design contest. Around 1700 school-students (7th -12th class) participated in the exhibition. School students and delegates enjoyed the exhibition during three days (5th-7th December).

Valedictory session of the conference was attended by Prof. Timothy Gonsalves, Director, IIT Mandi, Shri Kulbhushan Batra (chief guest), General Manager, Engineering Division and Pollution Research Control Institute, BHEL Haridwar, and Shri J. K. Agarwal (Guest of Honor) member Bureau of Indian standard.

In his concluding address, Prof Timothy Gonsalves, Director, IIT Mandi stated that the aim of the conference was to create a cross-disciplinary summit that will transcend departmental, institutional, industrial, public and private research organisations and global barriers in the field of machines and mechanisms.



School students during ISRO exhibition.



Valedictory function: (from left to right) Prof. Timothy Gonsalves, Dr. Rajeev Kumar, Prof. S. C. Jain, Shri Kulbhusan Batra, Shri J. K. Agrawal and Dr. Rahul Vaish



Best student paper awarded by Shri Kulbhusan Batra



SMDC awarded by Shri J K Agrawal

iNaCoMM 2019 helped in identifying the latest developments in various aspects of machines & mechanisms and future trends and assess the overall importance. This resulted in extensive exchange of information and networking among the participants in the new technologies leading to collaborative research projects. In his address, Shri Kulbhusan Batra introduced BHEL to the delegates. He stated that making smart machine is the present day need. Machine should be made with artificial intelligence. He also mentioned about challenges to the thermal based power plant. In the end best paper and student best paper awards were given by Shri Kulbhusan Batra. Student mechanism design contest awards were given by Shri J. K. Agarwal to threebest teams.

## Forthcoming Events

### 6th Joint International Conference on Multibody System Dynamics and the 10th Asian Conference on Multibody Dynamics

The 6<sup>th</sup> Joint International Conference on  
Multibody System Dynamics

IMSD

The 10<sup>th</sup>

ACMD 2020

Asian Conference on Multibody Dynamics

Dear Colleague,

The 6<sup>th</sup> Joint International Conference on Multibody System Dynamics and the 10<sup>th</sup> Asian Conference on Multibody Dynamics will be held on November 1-5, 2020 in New Delhi, India. The conference is organized in several specialized sessions representing different aspects of the computational & experimental solution of the dynamics of multibody systems. We invite you to submit a paper to the conference which focuses on dynamics of multibody systems. Submission deadline for Extended Abstract is April 30, 2020. The abstracts must be submitted through the website of the conference <http://imsdacmd2020.iitd.ac.in/index.html> which will soon be available for online submission.

For your ready reference, the "Second Announcement and Call for Papers" is attached.

We are looking forward to your acceptance of this invitation, and have the opportunity to meet you in New Delhi.

Sincerely yours,

Subir K. Saha(IIT Delhi., India) [saha@mech.iitd.ac.in](mailto:saha@mech.iitd.ac.in)

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### Objectives

The biannual international conferences IMSD and ACMD aim to bring together researchers in multibody dynamics from both academia and industry and to promote opportunities to exchange cutting-edge information on the theory and application of multibody systems. As one of the rapidly growing branches of mechanical engineering, multibody system dynamics is applied to various applications, and is becoming increasingly important in the development of complex engineering systems. The IMSD and ACMD will provide a unique opportunity to identify the current challenges, share solutions, and promote friendships between the two multibody dynamics communities.

### Venue

The conference is organised by Indian Institute of Technology Delhi (IIT Delhi) and will take place at Eros Hotel in Nehru Place, New Delhi, India. New Delhi is the capital of the country and is directly connected by air from many cities worldwide. The weather during the conference will be pleasant (13° to 27° C). The city has many historical monuments and is one of the most visited places by foreigners.

### Keynote Speakers

The conference will have keynote lectures by the following experts in the field of Multibody Dynamics:

Alberto Cardona (Argentina)  
Etsujiro Imanishi (Japan)  
Robert Seifried (Germany)  
Radu Serban (USA)  
Shankar Venugopal (India)  
Hao Wang (China)  
Hong Hee Yoo (Korea)

### Call for Papers

Authors are invited to submit two page extended abstracts, clearly stating the objectives, results and conclusions of the work to be discussed in the presentation. After the review process, accepted abstracts will be included in the book of abstracts. Full paper submission is optional, which will be subjected to further peer-review to be included in one of three Springer publications mentioned under Authors Center in the website.

The topics of the conference include, but are not limited to:

- Applications, Multidisciplinary Methods, and Other Topics
- Benchmark Problems in Multibody System Dynamics (MSD)
- Biomechanics
- Computational Methods and Real-Time Applications
- Contact, Impact, and Constraints
- Control, Mechatronics, and Robotics
- Dynamics of Vehicles
- Flexible Multibody Systems
- Modeling, Formalisms, and Theoretical Methods
- Multibody Kinematics
- MSD for Social Applications
- Optimization, Sensitivity Analysis, and Parameter Identification



### Organized By:



IIT Delhi

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