



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

I on behalf of office bearers am thankful for the active support of all members to bring out this issue of the Bulletin. Contribution of Dr. B. Vinod (ZVP –South Zone) for the present issue and that of Dr. Nirmal Baran Hui (ZVP –East Zone) and Dr. Ashish Singla (ZVP – North Zone) for previous issues is also acknowledged.

Even though difficult situations are still continuing, many new things have also happened during last few months. Almost all of the higher education institutes are back to business, examinations were conducted, new semesters have started and research work is also progressing. We academicians have adopted the new norms of online teaching and evaluation. Benefits of this online teaching are farfetched, not only for easy access to a wider population but also for more options availability to the students. The steps are already taken and we need to explore all the possibilities.

Prof. B. Vinod, has rightly pointed out that “We should be proud of how far we have come up against the pandemic as yet by surpassing our work in the field of the Research and Development by guiding students on invention of various products and services helpful to overcome these hard days”.

It will be worth mentioning that during these few months National Educational Policy has also come into effect and the responsibility for its implementation again lays mostly on us. Many new experiences will be learned during its implementation and we will be laying few foundation stones for the next generation.

Lastly I put forth the Lines of Our Laureate, Dr.A.P.J..Abdul Kalam “We are as young as our faith and as old as our doubts”.

Oct. 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. 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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Report on AICTE – ATAL & NITTTR Chandigarh organized Faculty Development Programme on Sensor Technology



Sensors are required to be a crucial aspect of the example of overcoming adversity of Industry 4.0. The Public Foundation of Specialized Instructors Preparing and Exploration NITTTR, Chandigarh stepped forward toward this path. 5 days web based training on Sensors Innovation was conducted for employees, researchers and industry work force under 'AICTE Training and Learning (ATAL) Academy' sponsored programme. The program was conducted from September 21, 2020 to September 25, 2020.

The main visitor of the program was Teacher (Dr.) Shyam Sundar Pattnaik Chief, NITTTR Chandigarh. He featured the significance of sensors innovation in improving clinical diagnostics and upgrading execution of energy gadgets, for example, power devices and batteries. Dr. Pattnaik talked about the utility of sensors in improving wellbeing,

security and clarified their part in space investigation and ecological observing.

The program covered different parts of sensors innovation, for example, nano-sensors electrochemical biosensors, Nanostructures based gas sensors and Adaptable and savvy sensors. The main visitor of the mutually composed 68 online staff improvement programs all through the nation was Prof. Anil D. Sahasrabudhe, Administrator, AICTE, New Delhi. 200 members were enrolled for the program. The program was facilitated by Dr. Ashok Kumar and Prof. Pankaj Sharma.

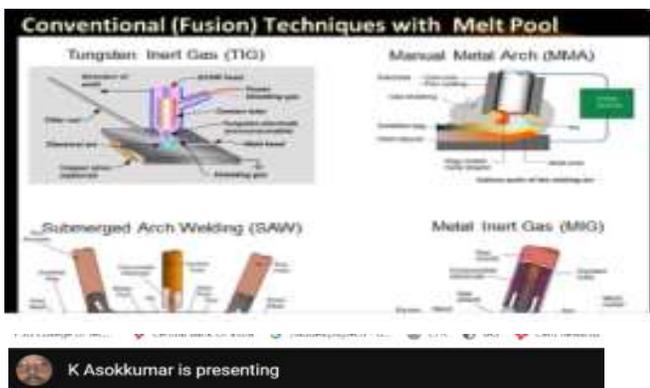
The experts in the program included Dr. Ketan Kotecha, CEO of Symbiosis Centre for Applied Artificial Intelligence and Director of Symbiosis Institute of Technology, Mr. Nischal Kapoor, VP and Head of Worldwide Technique – Tech Mahindra; Prof. B. S. Satyanarayana, CEO, Satya Bharathi and previous Vice Chancellor BML Munjal College; Mr. Hardik Patel, President Epsilon Gadgets, Gujarat; Prof. Sunita Rattan, Chief, Friendship Foundation of Applied Sciences, Harmony College, Uttar Pradesh; Dr. Mrinal Buddy, Senior Head Researcher, CSIR-CGCRI Kolkata; Dr. Baban Kumar Bonsod, Head Researcher, CSIR-CSIO Chandigarh; Dr Rahul Prajesh, Senior Scientist, CSIR-CEERI, Pilani, Dr. Tharamani C N and Dr. Rajendra Prasad, IIT Ropar; Dr. C R Mariappan, NIT Kurukshetra; Dr. Nikhil Marriwala, HoD, ECE, UIET, Kurukshetra College; and Dr. Ritula Thakur, Dr. Ashok Kumar and Prof. Pankaj Sharma, NITTTR Chandigarh.

Report on AICTE – ATAL Sponsored & PSG Coimbatore organized FDP on Robotic Welding and Welding Automation

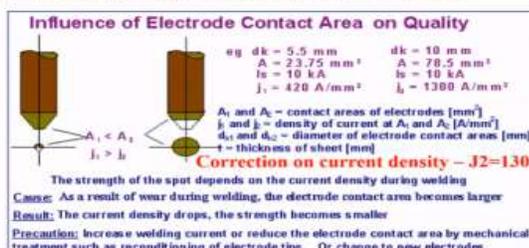


An AICTE-ATAL Sponsored Online Faculty Development Programme on “Robotic Welding and Welding Automation”, (September 21-25, 2020) was organized in PSG College of Technology, Coimbatore. 133 participants registered of various engineering and polytechnic colleges from all over India. The programme was coordinated by Dr. N. Murugan, Professor, Dr. S. Prabhakaran, Assistant Professor and Ms.V. Parvathipriya, Assistant Professor from the Department of Robotics and Automation Engineering. The expert speakers were Mr. R Nipin Shankar, Manager, Lincoln Electric (India) Pvt. Ltd, Mr. I. Rajagopal, Managing Director, Primo Automation, Dr. P. R. Venkateswaran, Manager,

WRI, BHEL, Ms. A. Santhakumari, Senior Deputy General Manager, WRI, BHEL, Dr. K. Ashok kumar, Assistant General Manager, COE Welding Engineering & Technology, PSGCT, Dr. S. Suresh, General Manager, COE Welding Engineering & Technology, PSGCT, Mr. P. Sasi Anand, Manager, Fronius India Pvt. Ltd., Mr. Avirup Ghosh, Business Lead-Robotics, Kempfi, Dr. M. Vasudevan, Head, Materials Development and Technology Division, IGCAR, Dr. Murugaiyan Amirthalingam, Head, Joining and Additive Manufacturing Laboratory, IIT Madras, Dr. B. Vinod, Head - Department of Robotics and Automation Engineering, PSGCT.



Relationship between material thickness and electrode dia



Forthcoming events

1st International & 13th National Conference on Industrial Problems on Machines and Mechanisms (IPROMM-2020)

Dear members,

Mechanical Engineering Department, BITS-Pilani, Hyderabad Campus, Telangana, under the aegis of Association for Machines and Mechanisms (AMM), and the International Federation for the Promotion of Mechanism and Machine Science (IFTOMM) announces the 1st International & 13th National conference on Industrial Problems on Machines and Mechanisms (IPRoMM-2020) to be held at BITS-Pilani, Hyderabad Campus, Telangana between December, 21 to 22, 2020. Conference focuses on various topics and we invite you to submit your abstract on topic of our interest.

Please do find the links for abstract and paper submission

For Abstract/Paper submission template visit: <https://easychair.org/conferences/?conf=ipromm2020>

Sincerely,

Shanmukhasundaram V.R (On behalf of IPRoMM 2020, Organizing committee)

ABOUT IPRoMM 2020

The conference will address issues in the design, manufacture and performance of mechanical and mechatronic elements and systems that are employed in modern machines and devices. The aim is to highlight the problems associated with such machinery, their design and development, operation, testing, maintenance and other engineering aspects. The proceedings would thus be a compendium of such topics focussing on the engineering aspects in the broad area of Machines and Mechanisms.

Because of the Covid-19 related national-level restrictions by the government of India against physical gatherings of people, the IPRoMM-2020 will be conducted in virtual mode. For details, please see the conference website.

SCOPE OF THE CONFERENCE

Though not limited to, this conference broadly covers following topics:

- ❖ Robotics, Industrial CAD/CAM systems, Mechatronics.
- ❖ Machinery of manufacturing technology.
- ❖ Material handling and automated assembly.
- ❖ Devices for aerospace, automobile and railways.
- ❖ Micro-machines, MEMS and NEMS

Authors are requested to bring into focus the problems encountered in practice and the associated solutions developed by them. Papers that highlight industrial problems and those calling for further research may also be submitted.

Pre-Conference Workshop (EV-2020)

A National workshop on Emerging Technologies of Electric Vehicles & Hybrid Electric Vehicles will be organised on 19th and 20th December 2020. The workshop will cover challenges in design, manufacturing and control systems for electric vehicles & hybrid electric vehicles. For more details, refer to conference [website](#).

Call for papers

Track 1: Robotics, Industrial CAD/CAM systems, Mechatronics

Track 2: Machinery associated with conventional, unconventional manufacturing systems and additive manufacturing

Track 3: Material handling and automated assembly

Track 4: Devices for aerospace, automobile and railways

Track 5: Mechanical and electro-mechanical systems of modern machinery

Track 6: Bio-medical devices and Bio-mechanisms

Track 7: Space applications

Track 8: Integration of IoT and Industry 4.0 in mechanism and machines

Track 9: MEMS and micro-devices

Track 10: Compliant mechanisms

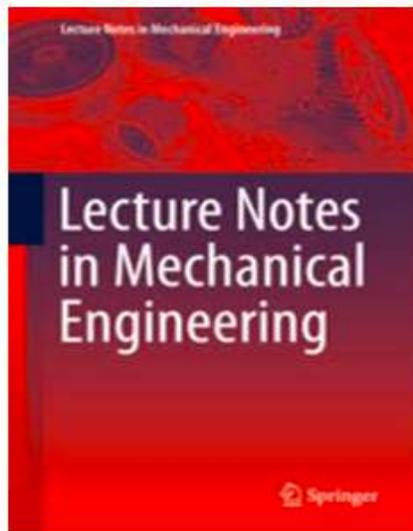
Track 11: Hybrid electric vehicle and electric vehicle mechanisms

Track 12: Acoustics and noise control

Track 13: Pressure vessels

PROCEEDINGS

Conference proceedings will be published as an e-book by Springer engineering which is indexed in Web of Science Scopus and others.



The deliberations of the conference will be in terms of oral as well as poster presentations.

All the accepted and presented papers during the conference will be published as digital proceedings. Selected papers could also be considered for publication in reputed Journals.



**1st International
&
13th National Conference
on
Industrial Problems on Machines and
Mechanisms (IPRoMM-2020)**



on December 21&22, 2020, through On-Line Presence

Paper submission through easy chair platform

<http://sites.bits-hyderabad.ac.in/ipromm2020/index.php>



Scope: Robotics, Industrial CAD/CAM systems, Mechatronics, Machinery associated with convention-al & unconventional manufacturing systems, Material handling and automated assembly, Devices for aero-space, automobile and railways, Mechanical and electro-mechanical systems of modern machinery, Bio-medical devices and Bio-mechanisms, Space applications, Integration of IoT and Industry 4.0 in mechanism and machines, MEMS and micro-devices, Compliant mechanisms, Hybrid electric vehicle and electric

Important dates

Abstract Submission: July 30, 2020

Full Paper Submission: Sep. 21, 2020

Camera-Ready Script

Submission after Review: Nov. 21, 2020

Conference Proceeding will be published in Springer Book Series



Organized by

Department of Mechanical Engineering,

BITS Pilani, Hyderabad Campus

Under the aegis of

**Association of Machines and Mechanisms
(AMM), India**

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<http://sites.bits-hyderabad.ac.in/ipromm2020>

1st International
&
13th National Conference
on
**INDUSTRIAL PROBLEMS ON
MACHINES & MECHANISMS
(IPRoMM-2020)**



Organized by

Department of Mechanical
Engineering, BITS Pilani,
Hyderabad Campus, Telangana

Under the aegis of

Association of Machines and
Mechanisms (AMM), India

December 21 & 22, 2020

National workshop on

Emerging Technologies of Electric Vehicles & Hybrid Electric Vehicles: Challenges in Design, Manufacturing and Control Systems

(EV-2020)

19th-20th December 2020

EV-2020 is a pre-conference workshop for IPROMM-2020 (Dec 21-22nd, 2020). Interested delegates can register for EV-2020 and IPROMM-2020 together and attend both the events on a single trip.

Because of the Covid-19 related national-level restrictions by the government of India against physical gatherings of people, the EV-2020 will take place in virtual mode. For details, please see the conference website.

[\(http://sites.bits-hyderabad.ac.in/ipromm2020/\)](http://sites.bits-hyderabad.ac.in/ipromm2020/)

Confirmed Expert Speakers So Far:

- (1) Mukesh Bhandari, Chairman, Electrotherm, Ahmedabad
- (2) R. Gopalan, Regional Director, ARCI, Chennai
- (3) Sundaresan, VP, Electrical Vehicles, Ashok Leyland, Chennai
- (4) Ashish Tarte, Head, Product Development & Engg Services, Mahindra Electric, Bengaluru
- (5) Hufeza A.C, Domain Head, Electric and Hybrid Vehicle Technology at Ashok Leyland, Chennai
- (6) Dr. Sholapurwala, Chairman, Zeonics Systech

Target Audience: Mechanical, manufacturing and automotive engineers, faculty members of engineering institutes, doctoral research and Masters students of related disciplines

Broad Areas of EV/HEV Covered: <ul style="list-style-type: none">• Mechanical transmission and electric control system design• Energy and economic aspects• Simulation and analysis	*Registration Fee (including GST)(INR):	
	Students (institute ID proof needed)	500
	Faculty members of academic institutions	1500
	Industrial delegates	1500

*Registration fee payment details are same as those for IPROMM-2020. Mention EV- 2020 clearly in the registration. For more details, see the <http://sites.bits-hyderabad.ac.in/ipmm>.

Last date for registration: 16th October 2020.

To register, send an email to ev2020@hyderabad.bits-pilani.ac.in. Last date to register is the same as that for IPROMM-2020 conference.

Coordinators:

Prof. Srinivasa Prakash Regalla, regalla@hyderabad.bits-pilani.ac.in, 9010202879

Prof. N. Suresh Kumar Reddy, nskreddy@hyderabad.bits-pilani.ac.in.

Prof. Alivelu Manga Parimi, alivelu@hyderabad.bits-pilani.ac.in.

Dr. Bade Simhachalam, THIL, Chennai, SimhachalamB@tii.murugappa.com.

Forthcoming events

IIT Ropar & TRS presents AICTE sponsored Faculty Development Program

on

“Robotics System Design: Fundamentals, Challenges and Applications”



Dear members,

The Robotics Society - biennial workshop 2020 - is planned to be hosted at IIT Ropar. Due to the prevailing Covid-19 conditions, the program is now scheduled in ONLINE mode during November 2-6, 2020. The one-week program aims to gather researchers from diverse fields related to Robotic Design and focus at the fundamental requirements, the normally faced challenges and case-studies on robotic systems designs by renowned researchers. The workshop will work as a catalyst in addressing the upcoming enthusiasm, research and interests in Robotics design field.

Sponsored by ATAL, AICTE (as FDP) - the registration is open to the faculty members, researchers, practitioners, industry personnel, post-graduate students and research scholars.

The schedule is as follows.

Title: Robotic System Design: Fundamentals, Challenges and Applications

Date: November 2-6, 2020

Last date to apply: October 15, 2020

Coordinator: Dr Ekta Singla

How to Apply:

Online registration through AICTE portal.

Link: <http://www.aicte-india.org/atal>, <http://atalacademy.aicte-india.org/login>

For any query email the undersigned at robo-design-fdp@iitrpr.ac.in or call to Mr Kaushal: 9256333921

Program contents

- Kinematics Modelling and Analysis of Manipulators and Mobile robots
- Kinematic Performance Analysis
- Mechanism Design
- System Dynamics and Control
- Robot Design Strategies
- Artificial Intelligence
- Robotics Operating System (ROS)
- Modular Robotics Design
- Reconfigurable Robotics
- Design Challenges in Agriculture, Medical and Defence Applications
- Online Demonstration of Robotic Manipulators, Mobile Robots, Humanoid Robots & Cobots



PunjRobotics

IIT Ropar and TRS presents
AICTE sponsored
Faculty Development Program
on

Robotics System Design: Fundamentals, Challenges and Applications

Nov 2-6, 2020



Hosted by:



Mechanical Engineering Department
Indian Institute of Technology Ropar
Main Campus, Roopnagar
Punjab- 140001, India.
www.iitrpr.ac.in

About IIT Ropar



IIT Ropar is one of the second generation IITs set up by Ministry of Education, Government of India. The institute is committed to provide state-of-the-art technical education in a variety of fields and for facilitating transmission of knowledge in keeping with latest developments in pedagogy. These two areas of focus will enable students to gain exposure to recent trends in their chosen domains of study and gain practical experience through a wide variety of activities the institute facilitates in its own campus and arranges industry and other institutes. With 389 PhD scholars in the Institute, 74 scholars have successfully defended their thesis and 142 scholars have joined the PhD program during the last one year. The atmosphere of vibrancy in the campus is delivering fantastic results in the span of a decade, the Times Higher Education World University Ranking 2020 is an example. PUNJRobotics is set up to formulate a common platform at IIT Ropar to uplift the interdisciplinary field of Robotics – within the institute and around for Robotics

The Robotics Society - TRS

The Robotics Society (TRS) is a registered Society with members from various academic and research institutes or organizations from India and overseas, and corporate members, all working in the fields of robotics. TRS was formed to have regular meetings and events to bring together the robotics community in India at large. It has successfully organized four international conferences in the form of Advances in Robotics (AIRs) every two years, starting in 2013. It has also organized many more Workshops on Robotics over the years, which have proved to be a good platform for sharing knowledge and networking amongst young researchers, faculty experts and roboticists from research organizations and industry. More details about TRS can be found at <http://www.rsindia.org>.

FDP and TRS workshop objective

TRS organizes a national workshop biennially at different locations towards the aim of creating critical masses in the advanced fields of Robotics. TRS workshop 2020 had been planned to be hosted at IIT Ropar campus, but due to Covid-19 situation the workshop is being scheduled for ONLINE mode. The one-week program aims to gather researchers from diverse fields related to Robotic Design and focus at the fundamental requirements, the normally faced challenges and case-studies on robotic systems designs by renowned researchers. The workshop will work as a catalyst in addressing the upcoming enthusiasm, research and interests in Robotics design field.

Program Contents

- Kinematics Modelling and Analysis of Manipulators and Mobile robots
- Kinematic Performance Analysis
- Mechanism Design
- System Dynamics and Control
- Robot Design Strategies
- Artificial Intelligence
- Robotics Operating System (ROS)
- Modular Robotics Design
- Reconfigurable Robotics
- Design Challenges in Agriculture, Medical and Defense Applications
- Online Demonstration of Robotic Manipulators, Mobile Robots, Humanoid Robots and Cobots.

Program Speakers

- Prof Ahmed Chemori, CNRS, France
- Prof Giuseppe Carbone, UNICAL, Italy
- Prof Asokan T., IIT Madras
- Prof Subir K. Saha, IIT Delhi
- Prof Ashish Dutta, IIT Kanpur
- Prof Pushparaj M Pathak, IIT Roorkee
- Mr Alok Mukherjee, R & DE Engg, DRDO Pune
- Prof S. Bandyopadhyay, IIT Madras
- Prof Ashish Singla, TIET, Patiala
- Prof Ekta Singla, IIT Ropar
- Prof Srikant S. Padhee, IIT Ropar

Program Registration

Fees:

There is NO registration fees to attend the course. Limited seats 200.

How to Apply:

Online registration through AICTE portal.

Link is given below.

<http://www.aicte-india.org/atal>

<http://atalacademy.aicte-india.org/login>

Registration Last Date:

October 15, 2020

Online mode details will be shared with shortlisted participants

Certification:

Program participation E-certification shall be awarded to the participants with 80% attendance and with a score of minimum 60% marks in a test being conducted on the last day of the program, and on submission of online feedback.

For any queries contact:

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Associate Professor and Head
Mechanical Engineering
Department, IIT Ropar,
Founder and Coordinator:
PUNJRobotics,
www.punjrobotics.com
email : robo-design-fdp@iitrpr.ac.in

Mr Kaushal: 9256333921
Mr Ashu Kaushik (): 7814405216

...a co-organization by

THE ROBOTICS SOCIETY

Forthcoming events

AICTE SPONSORED FACULTY DEVELOPMENT PROGRAMME ON “ROBOTICS AND AUTONOMOUS SYSTEMS” DEPARTMENT OF ROBOTICS AND AUTOMATION ENGINEERING PSG COLLEGE OF TECHNOLOGY COIMBATORE



Dear Members,

Educating and Learning is a significant cycle in scholastic establishments. Move of information happens from the educator to the understudies just when the instructing is viable. The youthful instructors need direction and preparing in successful educating. As a support of the showing network in the designing, AICTE supports various projects to advance the abilities of educating network. This FDP will be an amazing chance to tune in to the specialists in this field and furthermore to examine about the fundamental goal in territories applications. It has gotten significant for the teachers and rehearsing designers to ceaselessly refresh their insight and aptitudes in proof based practice procedures, little gathering assistance, dynamic addressing, and the profitable utilization of innovation which additionally assists the analysts and employees with refreshing their exploration abilities.

Registration link: <https://forms.gle/CMrxNyGZXT9WmvwK7>

Contents to be covered

- Introduction to Robotics
- Industrial Robotics Architecture
- Robot Kinematics
- Simulation tools for Robot dynamics
- Robot Controllers
- Robotic Drives and motors
- Cabling Systems for Robotics
- Pneumatic Systems in Robotics
- Robotic Control Systems
- Robotic Vision Systems
- End effectors
- Design of Grippers
- Robotic Welding
- Cable Driven Parallel Robots
- Robot Programming
- Autonomous Navigation
- Motion Control & Planning
- Intelligent Systems and Control
- Mobile Manipulators
- Robot Operating System (ROS)
- Wheeled Mobile Robots
- AI for Robotics
- Deep Learning for Robotics
- Space, Surgical, Underwater Robots
- Humanoid and Walking Robots
- Industry 4.0

Forthcoming events

AICTE Sponsored



Two Week Online
Faculty Development Program on

Robotics and Autonomous Systems

(BATCH - I)
16th - 28th August 2020



Coordinator
Dr. G.Subashini
Professor
Department of RAE

Organized by
Department of Robotics and Automation
Engineering
PSG College of Technology
Coimbatore - 641 004

Organizing Committee

Chairman: Dr. K. Prakashan
Principal In-charge
PSG College of Technology

Convenor: Dr. B. Vinod
Professor & Head In-charge
Department of RAE
PSG College of Technology

Coordinator: Dr. G. Subashini
Professor
Department of RAE

Co-coordinator: Dr. P. D. Rathika
Assistant Professor
Department of RAE

Registration

Participants should register online in the link:

<https://forms.gle/CMrxNyGZXT9WmvwK7>

or

Scan here for Registration



Important Dates

Last date for Registration : 08th Nov 2020

Confirmation of Participants : 12th Nov 2020

Resource persons

Experts from various Government Organizations, Industries and Academic Institutions.

Eligibility

The FDP is open to all faculty members from AICTE approved institutions, research scholars, participants from Government organizations and Industries.

Instructions to Participants

The FDP will be conducted in Online mode through Google Meet. Participants willing to participate in this online FDP should have the provision of laptop/desktop/smart phone with good quality internet connection and other audiovisual facilities, as required for online training.

Registration is free for all participants.

The participants are selected by organizers on first come first serve basis. Shortlisted candidates will be informed through their registered email id. On completion of the course an online objective test/quiz-based assessment will be conducted. Those who have an attendance of minimum 80 % and score more than 60% in the test will be issued a digital certificate.

Contact Details

Dr. G. Subashini
Mobile No: 9943039597
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About the College

PSG College of Technology, a premier institution for Engineering, was established by PSG & Sons' Charities Trust in the year 1951. The institution is well equipped with modern facilities of world class standards. The college is government-aided, autonomous, ISO 9001:2015 certified and affiliated to Anna University. The college offers a total of 63 full time and part time programmes in Engineering, Technology, Science and Management at UG, PG and Doctoral levels. The college maintains close interaction with several R&D institutions and institutions of higher learning in India and abroad. It also has close collaborative links with industries. Several advanced centres are set up with financial support from the Ministry of Human Resources Development, DST and other agencies.

About the Department

Department of Robotics and Automation Engineering (RAE) was established in the year 2011 to meet the growing demand for trained manpower in the field of Robotics and Industrial automation. Robotics and Automation Engineering is an inter-disciplinary course tailored to develop superior quality robotics and automation talent for manufacturing, defense, food, aerospace, medical and service sectors. The department has competent and committed academicians supported by professionals to enhance the quality of the program. The department also hosts ten Centers of Excellence (CoEs) that are actively involved in research and development projects and Consultancy services. The department has organized conferences and workshops that enable the students and faculty to access the latest trends in Robotics and Automation.

About the FDP

Teaching-Learning is an important process in academic institutions. Transfer of knowledge takes place from the teacher to the students only when the teaching is effective. The young teachers need orientation and training in effective teaching. As a service to the teaching community in the engineering, AICTE sponsors a number of programmes to enrich the skills of teaching community. This FDP will be an excellent opportunity to listen to the experts in this field and also to discuss about the underlying intention in areas applications. It has become important for the educators and practicing engineers to continuously update their knowledge and skills in evidence based practice strategies, small group facilitation, active lecturing, and the productive use of technology which also helps the researchers and faculty members to update their research skills.

This FDP on Robotics and Autonomous Systems aims to

- Introduce the participants to the concept of robotics and autonomous systems.
- Introduce the key approaches developed for decision-making in autonomous systems
- Introduce a contemporary platform for programming robots
- Introduce the key issues surrounding the development of autonomous robots
- Introduce a contemporary platform for experimental robotics
- Illustrate the design and development of various field service, mobile, collaborative and industrial robots
- Discuss the concepts of Artificial Intelligence, Machine Learning and Deep Learning behind robots
- Introduce the concepts of kinematics and dynamics of robotics and application of the same in various mobile robots

Topics to be Covered

- Introduction to Robotics
- Industrial Robotics Architecture
- Robot Kinematics
- Simulation tools for Robot dynamics
- Robot Controllers
- Robotic Drives and motors
- Cabling Systems for Robotics
- Pneumatic Systems in Robotics
- Robotic Control Systems
- Robotic Vision Systems
- End effectors
- Design of Grippers
- Robotic Welding
- Cable Driven Parallel Robots
- Robot Programming
- Autonomous Navigation
- Motion Control & Planning
- Intelligent Systems and Control
- Mobile Manipulators
- Robot Operating System (ROS)
- Wheeled Mobile Robots
- AI for Robotics
- Deep Learning for Robotics
- Space, Surgical, Underwater Robots
- Humanoid and Walking Robots
- Industry 4

Obituary



Professor J S Rao's passing away on July 4, 2020 has left many of his students, colleagues and friends shocked and a big void in the IFToMM community. Jammi Srinivasa Rao was born on 27th December 1939 in Madugula village in Andhra Pradesh, India, and in a career spanning nearly 60 years made extensive contributions in the fields of machine dynamics, vibration and engineering education. His contributions went beyond chosen areas of research and extended into industrial practice, particularly into the analysis and development of heavy and high-speed machinery for atomic and thermal power plants.

With his remarkable zeal and enthusiasm, he also contributed to the development of R&D laboratories across the country, the most notable ones being those established at IITs at Delhi and Kharagpur. His expertise was widely sought for failure analysis of rotating machinery. He could often bring to a problem, his all-round abilities in areas of vibrations, tribology and stress analysis and a depth of understanding that few could match. He played a major role in the national development with regard to defence, aeronautics and astronautics and participated actively in several projects of national importance.

He had strong academic credentials with a doctorate and a D.Sc. from IIT Kharagpur in 1965 and 1971, respectively. He supervised over 30 doctoral students at the two IITs (Kharagpur and Delhi) where he had taught. He authored over 300 research publications in journals and conferences wrote over 20 textbooks and were intimately involved in the establishment of the journal *Advances in Vibration Engineering* which was later renamed as *Journal of Vibration Engineering & Technologies*.

Prof. Rao has been honoured by several bodies for his scientific contributions and these include Fellowships of ASME, Indian National Academy of Engineering and the IFToMM Distinguished Service Award. He was intimately involved with IFToMM from the beginning – in preparing the constitution and its signing in 1969 in Poland. He was the Chair of the 6th World Congress held at New Delhi in 1983. In the same year, he along with Prof. Amarnath was also involved in setting up of the Association for Machines and Mechanisms -- the Indian affiliate of IFToMM.

He also played a major role in establishing the Rotor Dynamics Technical Committee of IFToMM and chaired it for two terms, steering it into a leading and highly reputed international body; he was elected lifetime Emeritus Chairman of this committee. He was also the Chairman of the Permanent Commission on Conferences and member of several committees of IFToMM over the years.

Prof. Rao was the last surviving member of the team who set up the IFToMM constitution in 1969. He is survived by his wife Mrs. Indira Rao, daughters Shailaja, son Chikka, grandchildren and great-grandchildren.

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