

From The Editor

20.11.2007

Dear Member,

Indian National Society for Aerospace and related Mechanisms (INSARM) is a professional body formed to promote all aspects related to research and development of mechanisms. It is essential that INSARM should grow fast as a professional body to be fully effective. For this its members need to be empowered to be in contact with each other and also with current developments around the world. A platform to help share technology news, ideas and concepts will be very useful indeed.

This e-journal is an attempt to fulfill these needs. Your active participation and suggestions can make this very a useful tool. It will also help make INSARM a unique professional body.

I appeal to you to contribute actively to the journal in the form of short technical articles, information on latest technology developments, successful application stories, etc related to mechanisms. Information on original source is always essential for further reading. Your ideas and suggestions for improving the journal itself are also most welcome.

With best regards

[P.S.NAIR]

**Half Day Seminar On
Aerospace Mechanisms****26.11.07****Annual General Body Meeting****YOU ARE CORDIALLY INVITED! FOR DETAILS, CLICK HERE.****AWAIT CALL FOR PAPER FOR NATIONAL SEMINAR ON
AEROSPACE AND RELATED MECHANISMS
AT ARDE, PUNE, ON 28 & 29 MARCH 2008.**For more details, look into www.insarm.org

1. Recent trends in Robotics for Aerospace applications

Prof. K. Kurien Issac, Dept. of Mechanical Engg., IIT, Mumbai

Abstract: Robots have become indispensable in space exploration. In this talk, we see the different contexts in which robots are useful in space. The special requirements and constraints on design and operation of space robots are reviewed. We see features of various robots which have been used in space. Finally, we look at some important issues related to space robotics and the recent developments in tackling these issues.



2. Multi-Axis Motion Control Through Digital Servo Technology

Dr. R. Sunder, BiSS Ltd. Bangalore

Abstract: Realistic simulation of natural phenomena such as earthquakes requires faithful and simultaneous reproduction in real-time of displacement, velocity and acceleration history along all three axes of both translational and rotational movement. Six actuator Stewart tables have become the natural choice for 3-axis 6DOF platforms with moderate performance requirements along all three axes. The exceptional requirements of earthquake simulation have however forced most test engineers to invest on 8-actuator solutions that much stiffer in response. This presentation describes the process of 8-actuator table development including the control hardware and software, hydraulic drive and structural design. Many features of the system were tailored to suit conditions specific to India. One such system is operational at IISc, while another is being readied at the Istanbul Technical University.

3. Tribological aspects of Space Robotic systems and mechanisms

Dr. V. Krishnan, Associate Director, IISU/ISRO

Abstract: Robotics is a fast evolving area where precise motion control has to be realized. The peculiar tribological strategies to be adopted to achieve precise motion control are discussed. The mechanism of lubrication based on fluid and solid lubricants, their dependence on the functional parameters and environmental aspects are covered here. The thin-film technology opened a new horizon in the solid lubrication technology which can provide solutions to long standing tribological problems specific to robotics. A brief introduction to thin-film technology, film development techniques and the pros and cons of thin-film based solid lubrication technology are addressed. The recent trends in the thin-film based solid lubrication technology, like diamond-like coatings (DLC), offers a promising candidate for the tribological applications in robotics. Tribology in the micro- and nano- worlds are peculiar. The challenges of this small world are of achieving ultra low friction and near zero wear. The theoretical and experimental methods in the tribology of micro- and nano- worlds are discussed



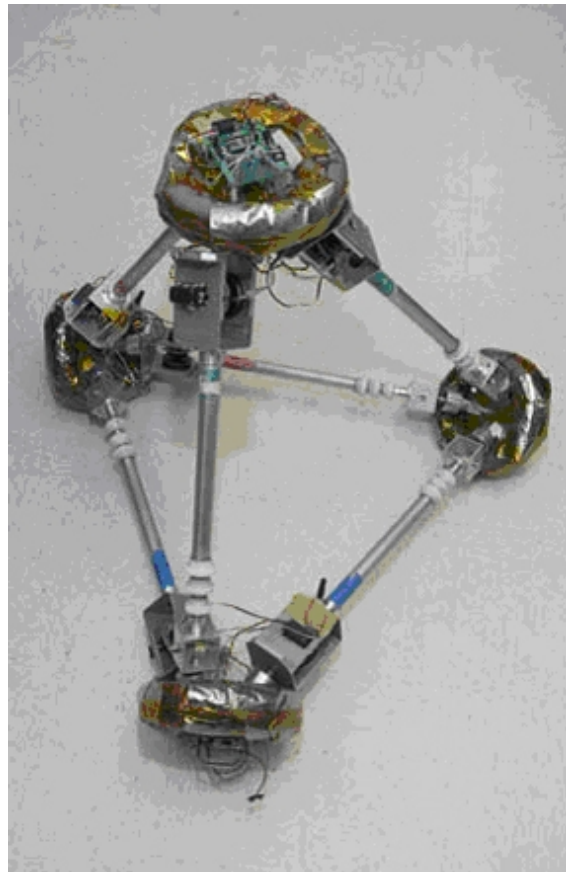
4. Applications of MEMS for Aerospace mechanisms

Prof. G. K. Ananthasuresh, Dept. of Mechanical Engg., IISc

Abstract: Small size, reduced weight, low cost, low power and perhaps improved performance are some of the advantages miniaturized systems bring to the fore for aerospace mechanisms. In this talk, we will present some sensors, actuators, power and thrust generation devices that are potentially useful in aerospace mechanisms. These include sensors for inertial navigation and monitoring of motion of components in space, actuators for shape control and corrections, switches, and components for deployment. On-chip power generation and distributed actuation will be discussed. Reliability, thermal stability, resistance to shocks, etc. are some of the issues that are important when micro electromechanical systems (MEMS) devices are used in space. This aspect will also be touched upon in this talk.

Tetwalker

Compiled by G.Nagesh, SMG, ISAC, Bangalore



Developmental work on shape shifting Robotic pyramids for space applications is in progress in NASA. This is a revolutionary type of Robot spacecraft called as Tetwalker (Tetrahedral Walker) as it resembles a Tetrahedron. Electric motors are located at the corners of the pyramid which act as nodes. The nodes are connected by struts which form the sides of the pyramid & the struts telescope like the legs of a camera tripod with the motors expanding / retracting the struts. Thus the c.g of the pyramid alters causing the same to topple over. It is proposed to make the same compact by replacing the motors with micro/ nano electro mechanical systems. Extensive research is on in artificial intelligence to get these robots move and work together in swarms automatically.

Related link: www.nasa.gov/vision/universe/robotic_explorers/ants.html

A Simple Docking Mechanism For Increasing Satellite Life

Compiled by C.D. Sridhara, Head ATD, SMG, ISAC

Large telecommunication satellites typically cost in excess of \$250 million to place in orbit, with an average useful on-orbit life of 10-15 years. Once their on-board propellant has been depleted, the satellites are boosted into a disposal orbit and decommissioned, even though their revenue-generating communications relay payloads are still functional.

Orbital Life Extension Vehicle (OLEV), a new-generation spacecraft will significantly prolong the operating lifetimes of these valuable telecommunications satellites. In addition, the OLEV can be deployed to “rescue” satellites stranded in incorrect orbits as the result of launch vehicle failures – moving the spacecraft to its intended revenue-generating orbital slot.

After launch, the OLEV will operate as an orbital “tugboat” – supplying the propulsion, navigation and guidance to maintain telecom satellites to their proper orbital slots for up to 12 additional years. With its ability to dock/undock up to five times, a single OLEV can be used to service one or several satellites.

OLEV is designed to easily mate with the majority of three-axis stabilized telecommunications satellites now in space or planned – and is optimized for spacecraft with a dry weight of approximately two metric tons.

After launch, the OLEV will rendezvous with the satellite, approaching it from above for docking. After fine alignment, it will link up using a special docking tool that connects to the telecommunication satellite's apogee kick motor. The nozzle of the AKM provides a strong, easily accessible interface point for the linkup that is aligned with the satellite's center of gravity.

The docking tool, a grapplescrew rod, which extends out from the OLEV, will enter the nozzle of the Apogee kick motor and extend its fangs such that it is rigidly fixed to the satellite to be serviced. Nearly every telecommunications satellite makes use of apogee kick motor for orbital boost and station keeping.

Courtesy: Orbital Satellite Services, Ltd

The above newsletter has been conceived during one of the meetings of the Bangalore chapter. It is planned to bring out the newsletter on a quarterly basis and the same will be circulated by email to all the members. This can also be downloaded from the web page of INSARM - Bangalore Chapter:

www.insarm-bangalore.org



We invite you to send technology news, contributed technical articles, members news and suggestions / comments on e-News letter and the web contents to Chairman editorial committee

***contactus@insarm-bangalore.org**
to help improve the newsletter.*

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