



AICTE Training and Learning Academy (ATAL)



Five Days Online Faculty Development Programme
on

Lighter-than-Air Systems



Organized by



**MANIPAL INSTITUTE
OF TECHNOLOGY**
MANIPAL
(A Constituent Unit of MAHE, Manipal)

Department of Aeronautical & Automobile Engg.,
Manipal Institute of Technology, Manipal
Udupi, Manipal, Karnataka - 576104
13 - 17 December 2021

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Professor, Aero. & Auto. Engg., MIT, MAHE, Manipal

Course Coordinator

Mr. Manikandan M.
Assistant Professor Sr. Scale
Department of Aeronautical & Automobile Engineering,
MIT, MAHE, Manipal, Karnataka - 576104
E-mail: manikandan.m@manipal.edu
Mobile: +91-8971145023

Manipal Academy of Higher Education (MAHE)

MAHE is synonymous with excellence in higher education. Over 28,000 students from 57 different nations live, learn and play in the sprawling University town, nestled on a plateau in Karnataka's Udupi district. It also has nearly 2500 faculty and almost 10000 other support and service staff, who cater to the various professional institutions in health sciences, engineering, management, communication and humanities which dot the Wi-Fi-enabled campus. The University has off-campus in Mangalore and Bangalore, and off-shore campuses in Dubai (UAE) and Melaka (Malaysia). Every institute has world class facilities and pedagogy, which are constantly reviewed and upgraded to reflect the latest trends and developments in higher education. In Manipal, these include educational facilities like the Simulation Lab with computer driven Manikins, an Innovation Centre, one of Asia's largest health sciences libraries, one of the world's best anatomy museums, a Business Incubation Centre and various other centers of excellence. Academic collaborations and with several universities in the US, UK, Australia and other countries ensure that students get international exposure and expertise.

Manipal Institute of Technology (MIT)

Manipal Institute of Technology (MIT Manipal) started in 1957, is reckoned for its academic excellence in engineering sciences. The institution offers graduate studies in 17 disciplines, 24 post graduate courses and PhD programs. The institution is ranked 51 by NIRF, accredited by NAAC and all the graduate courses are approved by NBA.

Department of Aeronautical & Automobile Engg.

The department of Aeronautical and Automobile engineering at Manipal Institute of Technology was established in 2008 and offers two undergraduate and two post graduate programs. The department has state-of-the-art infrastructure - Autoclave, Flight Simulator, Low Speed Subsonic Wind Tunnel, Advanced Composite Lab, Advanced Computation Lab, Gas Turbine Testing Rig, Avionics Lab, and Trinidad TB-20 Aircraft. The department houses the Center of Excellence for Avionics under the flagship of Manipal Academy of Higher Education (MAHE).

About The Programme

Interest in the potential of lighter-than-air (LTA) systems to meet modern requirements continues to grow as the cost and limitations of conventional aircraft transportation infrastructures increase. An added incentive to airship and aerostat development comes from the worldwide concern over the negative environmental effects of jet aircraft on the global climate. LTA systems have become the subject of renewed interest due to their unique qualities of low energy (propulsion) needs and significant static lift which holds potential for commercial as well as ISR missions. New hybrid LTA systems which incorporate a substantial degree of dynamic lift also offer great promise for providing additional air transportation services, and access to remote regions. Major advances are also being made in the development of key enabling technologies essential to the creation and operation of long endurance, unmanned LTA systems. This FDP course provides an overview of LTA systems and its fundamental aspects, the emerging trends in the design and development, role of LTA vehicles for various applications, and an introduction to hybrid airships.

The Expected Course Outcomes

On completion of this Faculty Development Programme, the participants should be able to

1. Understand merits and demerits of LTA Systems.
2. Appreciate the technological challenges involved in the design, development, and operation of an LTA system.
3. Appreciate current developments and future trends in design of LTA systems.

Mode of Delivery

All the technical sessions will be conducted online on a suitable platform. The respective links will be communicated to all the short-listed participants in due course of time.

Who Can Apply?

Faculty members of the AICTE approved institutions, Research scholars, PG scholars from AICTE approved institutions, Government agency, Industry participants, Staff of host institute (maximum of 30% of total participants), Only Indian nationals.

Technical Session Topics

1. Introduction and Overview of LTA Systems
2. Aerodynamics of Airships Including Added Mass Effects
3. Revisiting Hydrogen as Lifting Gas for Sustainable LTA Systems
3. Application of Airships in Cargo Transportation
4. Design and Analysis of Stratospheric Airships
5. Conceptual Design and Sizing of Airships
7. Envelope Materials for LTA systems
8. LTA Systems for Planetary Exploration
9. Structural Analysis of Inflatable Systems
10. Flight Performance Analysis of LTA Systems
11. Flight Dynamics of LTA Systems
12. Design and Development of Autonomous Airships
13. Conceptual Design of Winged Airships and Other LTA Systems
14. Hybrid Airships
15. Re-thinking the Ground Handling of LTA Systems

Details of Resource Persons

1. Prof. Rajkumar S. Pant, Department of Aerospace Engineering, IIT Bombay, Mumbai.
2. Mr. Johannes Eissing, Expert at Capgemini Engineering, ECOSAT Airships, University of Applied Sciences Hamburg, Germany.
3. Prof. Patrick Hendrick, Aero-Thermo-Mechanical (ATM) Research Unit, Ecole polytechnique de Bruxelles, Brussels.
4. Prof. Barry Prentice, Supply Chain Management, University of Manitoba, Winnipeg, Manitoba, Canada.
5. Dr. Mohammad Irfan Alam, Department of Aerospace Engineering, VIT, Bhopal.
6. Prof. Alessandro Ceruti, Department of Industrial Engineering, University of Bologna, Italy.
7. Prof. Mangala Joshi, Department of Textile Technology, IIT Delhi, New Delhi.
8. Prof. Graham Dorrington, School of Engineering, RMIT University, Melbourne, Australia
9. Prof. Dineshkumar Harursampath, Department of Aerospace Engineering, IISc, Bengaluru.
10. Dr. Brandon Buerge, Engineering Educator, Wichita State University, Kansas, USA.
11. Prof. Nandan K. Sinha, Head, Flight Dynamics and Control Lab, Department of Aerospace Engineering, IIT Madras, Chennai.

12. Prof. Luiz Carlos Sandoval Goes, Retired Professor, Department of Mechatronics, Instituto Tecnológico de Aeronautica, Brazil.
13. Dr. Daniel P. Raymer, President, Conceptual Research Corporation, California, USA.
14. Dr. Giles Camplin, Council Member of the Airship Association, London, UK.

Technical Session Plan

Day - 1, 13 December 2021

Session - 1 (9.30 - 11.30) **Prof. Rajkumar S. Pant**

Introduction and Overview of LTA Systems

Session - 2 (11.30 - 13.30) **Mr. Johannes Eissing**

Aerodynamics of Airships Including Added Mass Effects

Session - 3 (14.30 - 16.30) **Prof. Patrick Hendrick**

Revisiting Hydrogen as Lifting Gas for Sustainable LTA Systems

Day - 2, 14 December 2021

Session - 4 (9.00 - 11.00) **Prof. Barry Prentice**

Application of Airships in Cargo Transportation

Session - 5 (11.30 - 13.30) **Dr. Mohammad Irfan Alam**

Design and Analysis of Stratospheric Airships

Session - 6 (14.30 - 16.30) **Prof. Alessandro Ceruti**

Conceptual Design and Sizing of Airships

Day - 3, 15 December 2021

Session - 7 (9.00 - 11.00) **Prof. Mangala Joshi**

Envelope Materials for LTA Systems

Session - 8 (11.30 - 13.30) **Prof. Graham Dorrington**

LTA Systems for Planetary Exploration

Session - 9 (14.30 - 16.30) **Prof. Dineshkumar Harursampath**

Structural Analysis of Inflatable Systems

Day - 4, 16 December 2021

Session - 10 (9.00 - 11.00) **Dr. Brandon Buerge**

Flight Performance Analysis of Airships

Session - 11 (11.30 - 13.30) **Prof. Nandan K Sinha**

Flight Dynamics of LTA Systems

Session - 12 (14.30 - 16.30) **Prof. Luiz Carlos Sandoval Goes**

Design and Development of Autonomous Airships

Day - 5, 17 December 2021

Session - 13 (9.00 - 11.00) **Dr. Daniel P. Raymer**

Conceptual Design of Winged Airships and Other LTA Systems

Session - 14 (11.30 - 12.30) **Mr. Manikandan M.**

Hybrid Airships

Session - 15 (14.30 - 15.30) **Dr. Giles Camplin**

Re-thinking the Ground Handling of LTA Systems

End of Sessions (15.30 - 16.30) Feedback & Valedictory Function