PROGRAM DATES & VENUE

The program will be held during 07-18 July 2025 at IISc, Bangalore (Click Here for location).

COURSE FEE

Category		Until 30 June 2025	After 30 June 2025
Professional	MNC / PSU	₹ 50,000	₹ 60,000
	R&D Labs/ Centers, Academia	₹ 35,000	₹ 45,000
	MSME / Startup	₹ 30,000	₹ 35,000
Student	Ph.D.	₹ 20,000	₹ 25,000
	M. Tech.	₹ 12,500	₹ 15,000

Note:

a) 18% will be additionally charged for the GST.
b) 30% of the course fee will go to IISc as overhead.
c) For self-sponsored candidates, there will be 10% discount for IEEE CSS members (membership proof will be required).
d) The project staff of with BTech/MTech degree will be considered equivalent to MTech/PhD Students respectively.

TRAVEL & ACCOMODATION

On-campus guest-house rooms are reserved for sponsored DRDO participants only. All other attendees should contact the CCE office for hotel bookings assistance (some AC/non-AC rooms have been blocked near to IISc with rates comparable to IISc guest house). These rooms are allotted on a first-come, first-serve basis. Note that the room rent is not included in the course fee and it must be paid directly to the hotel. Additional nearby accommodation options are also available for independent booking.

With the support received from IEEE CSS, **25 selected meritorious graduate students from outside Bangalore will receive free lodging, plus 3000 INR allowance for their food expenses outside the workshop venue**. To apply, the student must write to the course coordinator Prof. R. Padhi (padhi@iisc.ac.in) and attach his/her student ID card, transcript, a letter of recommendation from the adviser/HoD, and copies of publications (if any).

TOPICS

Introduction and Motivation
Review of Flight Mechanics; Guidance and Control Loops
Basics of Optimization
Optimal Control Formulation, Transcription Method
Model Predictive Control
Optimal Control using Calculus of Variations
Classical Methods for Optimal Control
Dynamic Programming (DP) for Optimal Control
Approximate DP and Adaptive Critic
Classical and Optimal Guidance of Missiles
Classical and Optimal Guidance for Soft-Landing Missions
Optimal Computational Guidance for Aerospace Missions
Model Predictive Static Programming (MPSP) and Variants
Optimal Guidance of Missiles using MPSP
Optimal Guidance in Space Missions using MPSP
State and Control Constrained Optimal Control
Pseudo-Spectral and Birkoff Optimal Control
Embedded System Implementation
Linear Quadratic Regulator (LQR) and SDRE
Motion Planning with LQR for Autonomous Robots
Dynamic Game Theory
Linear and Extended Kalman Filter (KF)
Unscented KF and Space Applications
Particle Filter and Multi-target Estimation
Robust Control of Linear Systems
Transformation Allergic Robust Control
Dynamic Inversion for Nonlinear Autopilot Design
Adaptive Autopilot with PINN for Enhanced Robustness
Constrained Nonlinear and Robust Autopilot Design
Quizzes and Discussion Sessions

IEEE Control Systems Society™

TUTORIAL WORKSHOP ON

Advanced Guidance, Control and State Estimation for Aerospace Vehicles & Autonomous Systems

07 – 18 July 2025

This workshop is open for 70 participants on self-registration on selection basis. Early registration is highly encouraged.

Dept. of Aerospace Engineering
Indian Institute of Science
Bangalore, 560 012

SUMMARY

This well-structured and focused lecture series is designed to give a comprehensive exposure to academic faculties, Industry professionals, graduate students and working scientists/engineers about selected topics on Guidance, Optimal Control and State Estimation specifically for Aerospace vehicles and autonomous systems. Special care will be taken to maintain lucidity of the material, so that the participants of the course can follow the topics with ease and, more importantly, can make use of them in solving challenging research and development problems of academia, R&D labs, and industry. In addition, this course is supposed to build up sufficient background on some of the advanced topics so that further studies can be carried out by the attending participants independently.

INVITED SPEAKERS

Prof. Frank Allgöwer

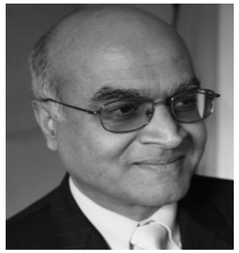
Director of Institute for Systems Theory and Automatic Control, University of Stuttgart, Germany

Prof. Frank Allgöwer is renowned for his contributions to nonlinear and model predictive control. His research is highly-cited.

Prof. I. M. Ross

Mechanical and Aerospace Engineering Department, Naval Postgraduate School, Monterey

Prof. I. M. Ross is a pioneer of pseudo-spectral and Birkoff optimal control, and their applications to various challenging aerospace problems.



Dr. P. K. Menon

Optimal Synthesis Inc. Los Altos, CA, USA

Dr. P. K. Menon is a renowned expert in optimal control and state estimation techniques and has solved numerous practical problems for guidance and control of aerospace vehicles.

Prof. R. K. Yedavalli

Emeritus Professor, Mechanical and Aerospace Engineering, Ohio State University, USA

Prof. R. K. Yedavalli has extensive experience in robust control and linear system stability analysis. He is the inventor of Transformation Allergic Robust Control.

Prof. Dayaram Sonawane

Asso. Professor, Instrumentation & Control, COEP Tech University, Pune

Prof. D. Sonawane focuses on embedded system implementation of model predictive control and other optimal control techniques.

Dr. Ravi Prakash

Assistant Professor, Robert Bosch Center for Cyber Physical Systems, IISc Bangalore

Dr. Ravi Prakash specializes in real-time state estimation, sensor fusion, and optimal robot control.

Dr. Sanat Biswas

Assistant Professor, Department of Electronics & Communications Engineering, IIIT Delhi

Dr. S. Biswas is an expert in Kalman Filter and applies it and other state estimation techniques to aerospace vehicles, drones, and robots.

Speaker & Workshop Co-Ordinator

Prof. Radhakant Padhi

HAG Professor, Aerospace Engineering, IISc Bangalore

Prof. R. Padhi is an excellent expert on Nonlinear, Optimal, Adaptive and Intelligent control, and their applications for Aerospace applications. Real-time optimal control for optimal guidance is one of his passions. He has also contributed to the G&C design of various missions of DRDO and ISRO.

REGISTRATION DETAILS

Interested participants can either scan the QR code below for registration or follow this link:

https://forms.office.com/r/HkUVnakbLR

Scan Here

Note:

1. A valid proof (e.g. copy of ID card) has to be provided during registration *if claiming for a discounted rate*. The registration is on first come first serve basis due to limited number of seats.
2. After filling this form, if you are shortlisted for the course then you will receive a link with a validity of 48 hours to complete the payment and upon payment completion your seat will be confirmed for the course.
3. If fee is not paid within 48 hours after the payment link is received, then the seat will be offered to next waitlisted candidate.

ADDRESS FOR CORRESPONDENCE

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Indian Institute of Science
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