

Air Traffic Model over Airspace (ATMA) of India



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Abstract: Rapid growth in the air-traffic over Indian airspace is slowly becoming quite overwhelming for the existing Air Traffic Control (ATC) system to handle. Appropriate safety measures need to be taken to maintain sufficient separation between them at all point of time while maximizing the air traffic volume in the available airspace at all time. Since different aircrafts fly at different speeds, and also cannot slowdown significantly for buying time for decision making, the problem is substantially complex. This problem is also aggravated in the vicinity of the airports located in metro cities. Since manual monitoring and guiding of all aircrafts 24/7 in real-time is rapidly becoming infeasible, optimal, intelligent and predictive decision-making technology needs to be developed to automate the process as much as possible. The first step in this direction is to have a reliable air-traffic flow model for all commercial flights, so that the traffic density in future time can be predicted and appropriate decision can be taken well ahead of time. This problem has been well recognized in the USA, and NASA has come up with the Future ATM Concepts Evaluation Tool (FACET) model. Using the FACET model, many interesting and useful research has been and are being carried out in the USA. Similar research is also being carried out in the Europe on the same topic. However, such a dynamic air-traffic model does not exist for Indian airspace. Keeping this in mind, an **Air Traffic Model over Airspace (ATMA) of India** is being created in IISc Bangalore. The model includes kinematics of flights, supported by several databases and procedures such as airport locations and runway orientations, SID/STAR procedures during takeoff and landing, flight schedule, flight routes, performance characteristics of aircrafts, wind profile data, and so on. This talk will give an overview of the overall problem and highlight the progress made so far in creating the ATMA of India model.

Bio: Dr. Radhakant Padhi is currently working as a Professor in the Department of Aerospace engineering, Indian Institute of Science, Bangalore. He did his Masters and Ph.D. in Aerospace Engineering from IISc Bangalore and Missouri University of Science and Technology (MST)–Rolla, USA respectively. He joined the IISc, Bangalore as a faculty in December 2003 and is continuing over there since then. He was also a scientist in RCI (DRDO), Hyderabad for a year during 1996-97.

Dr. Padhi is a Fellow of Indian National Academy of Engineers, Aeronautical Society of India, Astronautical Society of India, Institution of Engineers (India), and Institution of Electronics and Telecommunication Engineers (IETE). He is an Associate Fellow of American Institute of Aeronautics and Astronautics (AIAA), a Senior Member of IEEE and has served as a member of the Council of International Federation of Automatic Control (IFAC). He is also a member of Technical Committee on Aerospace in both IEEE and IFAC. He is a founding member and a past president of the Automatic Control and Dynamic Optimization Society (ACDOS), which is a National Member Organization of IFAC in India. He is a life member of Aeronautical Society of India, Systems Society of India and Soft Computing Research Society. He has also served as a steering committee member of the Asian Control Association.

Dr. Padhi's main research interest is on synthesis algorithms in optimal and nonlinear control as well as state estimation. He works on diverse application areas such as control and guidance of aerospace vehicles, biomedical systems, mechanical systems, distributed parameter systems, and industrial process control. He has over 270 publications in international journals and conferences and has received many awards and honours for his research contributions. He is a member of the technical review committee in DRDO and ISRO for several projects of national importance and has also directly contributed to various programs of DRDO and ISRO through intensive collaborative research.

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