Preface

As computer and Information Systems technology advances, industries such as aviation stand to benefit from the overwhelming new advances in hardware, software, and best practices. *Technology Engineering and Management in Aviation: Advancements and Discoveries* details the essential new developments in technology and management in the aviation industry. Specific and important advances in navigation, air traffic control, and environmental impact all make their way into this volume, which also focuses on management policies keeping up with new technology. This volume is a vital reference for practitioners, managers, students, and all those interested in the field of aviation.

*Technology Engineering and Management in Aviation: Advancements and Discoveries* is composed of 21 chapters written by highly qualified scholars discussing a wide range of topics spanning from aviation environmental crises to technological solution in the aviation industry. The first two chapters discuss aviation and environment; the first chapter is written by Mostafa Jafari, a lead author of IPCC, Nobel Peace Prize Winner for 2007; the second chapter is written by Enis T. Turgut & Marc A. Rosen.

The third and fourth chapters came from scholars affiliated with Boeing Company and Saab Aeronautics bother major airline manufacturers to discuss the topic of Human Factors. The third chapter covers *Enhancing Product Safety through Effective Human Factors Engineering Design Solutions* and the fourth discusses *Managing Human Factors in the Development of Fighter Aircraft*.


Chapters ten to twelve cover the safety and security issues in aviation. Chapter ten, *Next Generation Surveillance Technology for Airport and ATC Operations*, outlines the recent achievements in worldwide operational deployments in the fields of ADS-B and multilateration for airport and air traffic control applications and discusses the integration into larger aviation system applications. Furthermore, chapter eleven relates the study of *The Evaluation of Wireless Communication Devices: To Improve In-Flight Security Onboard Commercial Aircraft*. The chapter studies the effectiveness of discreet, secure, hands-free, wireless communications methods for enhancing coordination during security incidents among cabin crewmembers, between the cabin and flight compartment, ground support personnel, and reporting these findings. Chapter twelve, *Terrorist Attacks: A Safety Management System Training Tool for Airport and Airline Managers*, examines how airport and airline managers could review their incident
and command plans to enhance security counter-measures for terrorist attacks through the use of a well constructed plan-do-check-act (PDCA) tool, in the context of a Safety Management System (SMS), and incorporating a structured field survey into their emergency incident plan and command plan reviews.

Chapters thirteen to sixteen suggest computerized solution to existing aviation problems.

Chapter thirteen is titled **EPlanAirport: A Web-based tool to user-friendly decision-support systems for airport stakeholders and policy-makers.** EPlanAirport is a Web-based tool that allows running complex studies based on airport systems.

Chapter fourteen, **Airport Enterprise Service Bus with Self-Healing Architecture (AESB-SH),** introduces the different aviation and airport Information Technology systems. Also, it provides architecture based on the Service Oriented Architecture (SOA) that improves the information accessibility and sharing across the different airport departments, integrates the existing legacy systems with other applications, and improves and maximizes the system’s reliability, adaptability, robustness, and availability using the Self-Healing Agent and Virtual Web Service Connector to guarantee the Quality of Service (QoS).

Chapter fifteen, **Integrating Decision-Making Methodology, Flight Simulation and Computerized Systems to Advance Civil Aviation Safety,** focuses on the role of pilot/flightcrew training and performance evaluation in the identification and management of risk, especially while aloft and in changing conditions.

Chapter sixteen is titled: **Augmentation Systems: Use of Global Positioning System (GPS) in Aviation.** Several augmentation systems that serve local as well as wide coverage areas are discussed in this chapter, specifically the LAAS system, the WAAS system, as well as the EGNOS system. The architecture, as well the performance metrics for each of these augmentation systems, are presented and discussed.

Chapter seventeen through twenty one offer solutions to embedded problems in the IT world. The chapters discuss: simulation, networks congestion, Knowledge management, Virtual reality, and network analytical models.

Chapter seventeen, **Applying the Certification’s Standards to the Simulation Study Steps,** presents the certification standards applied with the simulation study steps, In addition to the Confidence Grid which is used to assets the quality (reliability and accuracy) of the data and the process of the simulation study step which will be the base for the validation and verification.

Chapter eighteen is titled: **Derivation A Discrete-time Analytical Model Based on Dynamic Random Early Drop Algorithm.** Congestion in networks considered a serious problem, and in order to manage and control this phenomena in early stages before it occurs, a derivation of a new discrete-time queuing network analytical model based on dynamic random early drop (DRED) algorithm is derived to present analytical expressions to calculate three performance measures.

Chapter nineteen covers **Knowledge: an Information Systems Practical Perspective.** This chapter suggests to perceive knowledge from the point of view of IS, as an attempt to answer IS requirements better.

Chapter twenty is titled: **Virtual Reality in Architecture, Engineering and Beyond.** The aim of this chapter is to present how the VR also finds excellent application fields in architecture and in engineering. Examples include: in the teaching of the basic concepts, in techniques of graphic rebuilding for the building restoration, in realization of virtual visits inside buildings, and in urban generative processes simulated by computer.

Chapter twenty one is called: **Effects of Packet-Loss and Long Delay Cycles on the Performance of the TCP Protocol in Wireless Networks.** This chapter presents a description, derivation, implementation, and comparison of two well-known analytical models, namely, the PFTK and PLLDC models. The two models are based on the TCP Reno flavor as it is one of the more popular implementation on the Internet. These two models were implemented in a user-friendly TCP performance evaluation package (TCP-
The TCP-PEP was used to investigate the effect of packet-loss and long delay cycles on the TCP performance measured in terms of sending rate, throughput, and utilization factor. The results obtained from the PFTK and PLLDC models were compared with those obtained from equivalent simulations carried-out on the widely used NS-2 network simulator. The PLLDC model provides more accurate results (closer to the NS-2 results) than the PFTK model.

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Mohamed Said Safadi has been a professor in Electronic engineering since 1975. Prof Safadi earned his PhD, DEA (Diploma of Profound Studies), from Paul-Sabatier University – France. Currently, he is the Dean of the faculty of Informatics & Communication Engineering at Arab-International University. Prior to that he was Vice president of AIU, Visiting professor- Electronic & Computer Engineering Department, Faculty of technology- University of Portsmouth- UK, director of scientific research department. at Alkalamoon Private University-Syria, Chief-editor of the journal of Engineering Sciences at Damascus University, and a Member of the Arabic Academy (Majmaa-Allogha Alarabiah). He has supervised many Master and PhD students’ research. He is also the author of four books in communications systems, and has translated one book. He participated in many international IEEE conferences as committee member and chaired many sessions, as well as authored more than 14 original research papers.