Digital Engineering

Papers Presented at the AIAA Aviation Forum 2023

San Diego, California, USA
12-16 June 2023

ISBN: 978-1-7138-7875-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 12700 Sunrise Valley Drive, Suite 200, Reston, VA 20191, USA.

TABLE OF CONTENTS

DIGITAL MODELING & SIMULATION WITH ML/AI AND/OR HPC

Aviation-BERT: A Preliminary Aviation-Specific Natural Language Model 1
Chetan Chandra, Xiao Jing, Mayank V. Bendarkar, Kshitij Sawant, Lidya Elias, Michelle Kirby, Dimitri N. Mavris

SafeAeroBERT: Towards a Safety-Informed Aerospace-Specific Language Model..... 14
Sequoia R. Andrade, Hannah S. Walsh

BERT for Aviation Text Classification 23
Xiao Jing, Akul Chennakesavan, Chetan Chandra, Mayank V. Bendarkar, Michelle Kirby, Dimitri N. Mavris

Data-Driven Synthetic Air Data Estimation System Development for a Fighter Aircraft 38
Hasan Karali, Mevlut Uzun, Burak Yuksek, Gokhan Inalhan

DIGITAL ECOSYSTEM, DIGITAL THREAD AND DIGITAL TWIN

Toward an Aircraft Design and Supply Chain Co-Optimization Framework Using Multi-Commodity Network Flow Analysis 52
Elwyn Sirieys, Daniel C. Gochenaur, Charlotte H. Gump, Olivier L. De Weck

On the Use of Resilience Models as Digital Twins for Operational Support and In-Time Decision Making 63
Lukman Irshad, Daniel Hulse

Extended Kalman Filter for State Estimation in Microsoft AirSim..... 78
Suman Subedi, Lukas Höhndorf, Jun Shi, Xiang Fang, Zardosht Hodaie, Florian Holzapfel

Sensor Fusion Using Probabilistic Object Detection for State Estimation 98
Suman Subedi, Lukas Höhndorf, Rafal Kulaga, Zardosht Hodaie, Jun Shi, Xiang Fang, Florian Holzapfel

DIGITAL ENGINEERING VIRTUAL SESSION

Utilizing Computer Vision Algorithms to Detect Contrails.....116
Kartikey Sharma, Shrey Jain, Edward Wu, Ziad M. Fattah, Chatanya Sarin, Derek Maeshiro, Saurav Kumar, Arjun Rajaram

The Application of Digital Engineering at a Tier 1 Supplier and the Challenges of Integrating Throughout the Supply Chain (OEM to Tier 1 Supplier and Below) 127
Christopher M. Reinhart, John E. Huffman

Formalizing the Decomposition Process Between Elements in the RFLP Framework Using Axiomatic Design Theory 135
Ehiremen N. Omoarebun, Selçuk Cimtalay, Dimitri N. Mavris

Digital Engineering is Too Important to Be Left Alone to MBSE Practitioners..... 154
Rao Y. Mannepalli

Uncertainty Propagation in Orbital Mechanics Using Stochastic Expansion Methods 165
Indika Nakulugamuwa

Author Index