Olivia Pinon Fischer, Ph.D.

CHIEF, DIGITAL ENGINEERING DIVISION · SENIOR RESEARCH ENGINEER

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EDUCATION

Georgia Institute of Technology　　　　　　　　　　　　　　　　*Atlanta, GA, U.S.A.*

PH.D. IN AEROSPACE ENGINEERING　　　　　　　　　　　　　　　*Aug. 2006 - May 2012*

International Space University　　　　　　　　　　　　　　　　*Strasbourg, France*

M.SC. IN SPACE STUDIES　　　　　　　　　　　　　　　　　　*Aug. 2005 - Aug. 2006*

Oregon State University　　　　　　　　　　　　　　　　　　*Corvallis, OR, U.S.A.*

M.SC. IN MECHANICAL ENGINEERING AND IN WOOD SCIENCE & ENGINEERING (DUAL DEGREE)　　　*Sept. 2002 - May 2005*

Institut des Sciences et Techniques de l'Ingénieur de Lyon　　　　　　　*Lyon, France*

M.SC. IN MECHANICAL ENGINEERING　　　　　　　　　　　　　*Sept. 2000 - June 2003*

Université Claude Bernard Lyon 1　　　　　　　　　　　　　　*Lyon, France*

B.SC. EQUIVALENT IN MATHEMATICS AND PHYSICS　　　　　　　　*Sept. 1997 - June 2000*

EMPLOYMENT

Georgia Institute of Technology, Aerospace Systems Design Laboratory (ASDL)　　*Atlanta, GA, U.S.A.*

SENIOR RESEARCH ENGINEER AND CHIEF, DIGITAL ENGINEERING DIVISION　　　*July 2018 - Present*

- Lead and manage multi-disciplinary research teams in the fields of digital engineering, digital twins & ecosystems, smart infrastructure technology development & implementation, model-based systems engineering, digital factories, production analytics, machine learning, deep learning, artificial intelligence, data fusion, big data, strategic planning, data/text mining, visual analytics, and decision support.
- Support meetings and interact directly with sponsors/clients from both government and industry.
- Lead and develop proposals, manage research activities among other research faculty and graduate students, manage schedules, budgets and deliverables.
- Work with ASDL Strategic Manager to develop leads for sponsored research projects.
- Supervise Master and Doctoral students' academic research and serve on M.Sc. and Ph.D. thesis committees.
- Participate and contribute to technical committees within AIAA.

Georgia Institute of Technology, Aerospace Systems Design Laboratory (ASDL)　　*Atlanta, GA, U.S.A.*

RESEARCH ENGINEER II AND CHIEF, MANUFACTURING SYSTEMS & PROCESS DESIGN BRANCH　　*May 2012 - June 2018*

- Led and managed multi-disciplinary research teams in the fields of production analytics, aircraft and UAV/UAS affordability-based design, manufacturing-influenced design, technology portfolio and strategic planning, and data/text mining and visual analytics.
- Coordinated research among other research faculty and graduate students.
- Worked with ASDL Strategic Manager to develop leads for sponsored research projects.
- Supervised Master and Doctoral students' academic research and served on M.Sc. and Ph.D. thesis committees.

Georgia Institute of Technology, Aerospace Systems Design Laboratory (ASDL)　　*Atlanta, GA, U.S.A.*

SENIOR GRADUATE RESEARCHER　　　　　　　　　　　　　　　*May 2006 - May 2012*

University of Michigan, Department of Aerospace Engineering　　　　　*Ann Arbor, MI, U.S.A.*

VISITING SCHOLAR　　　　　　　　　　　　　　　　　　　*May 2006 - Aug. 2006*

Oregon State University, Department of Foreign Languages　　　　　*Corvallis, OR, U.S.A.*

INSTRUCTOR　　　　　　　　　　　　　　　　　　　　　*Sept. 2002 - Mar. 2005*

CONSULTING

Freelance Consultant   *2013 - 2015*

COMPANY: KEE ENERGY / CLIENT: NISSAN

Project overview: Technical analyst for Kee Energy in an effort to determine feasible and viable strategies for the introduction and sustainment of electric taxi systems worldwide using historical data sets of taxi patterns in several cities (New York, Barcelona). The effort culminated in a visual, strategic, decision support system to bring together key stakeholders to find mutually agreeable paths forward.

Software Development   *Jan. 2001 - Dec. 2002*

CLIENT: INSTITUT DE MÉDECINE HUMAINE (IMH)   *Geneva, Switzerland*

Project overview: Developed an application in C++ to support the processing and visualization of biological test results

HONORS & AWARDS

AIAA Associate Fellow   *January 2022*

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (AIAA)

Description: Awarded to individuals of distinction who have made notable and valuable contributions to the arts, sciences, or technology of aeronautics or astronautics.

Georgia Tech Police Department's Student Partnership award   *March 2020*

GEORGIA TECH POLICE DEPARTMENT

Description: Awarded to research faculty and students for their contributions to a safer campus by ASDL's Grand Challenge team.

Simio Student Competition   *May 2016*

ADVISOR TO FIRST PLACE TEAM

Simio Student Competition   *May 2015*

ADVISOR TO FIRST PLACE TEAM

Thales, Air Systems Division   *2007 - 2010*

FELLOWSHIP

European Space Agency (ESA)   *2005*

SCHOLARSHIP

RESEARCH

Deep Learning for Robotics Applications   *December 2021 - Present*

SPONSOR: LOCKHEED MARTIN CORPORATION

Role: Co-Investigator
Project overview: Demonstrate the performance of relevant deep learning approaches and their ability to overcome the issues associated with the time and cost of generating training data when training a robot on wire-taping tasks.

Completing the Lifecycle Digital Thread   *September 2021 - Present*

SPONSOR: ROLLS ROYCE CORPORATION

Role: Co-Investigator
Project overview: This research focuses on 1) demonstrating the integration of functional data with a MBSE model and 2) extending an existing data architecture to demonstrate tracking/curation of relevant model parameters.

Smart Building Infrastructure   *September 2021 - Present*

SPONSOR: SIEMENS TECHNOLOGY

Role: Co-Investigator
Project overview: Explore and quantify trade-offs in design & operation of buildings using an MBSE approach and environment.

Sustainable Mobility

SPONSOR: SIEMENS TECHNOLOGY

Role: Co-Investigator

Project overview: Provide recommendations to assist with strategic mobility planning as part of further developing an aerotropolis area with connected housing and business districts. In particular, 1) develop a mobility modeling environment which simulates mass transportation scenarios within an aerotropolis region, and 2) develop a decision-support environment to allow stakeholders to compare different sustainable mobility options and visualize the impacts of those choices.

Internet of Warfighting Things: Multi-Domain Command & Control
September 2021 - Present

SPONSOR: NORTHROP GRUMMAN CORPORATION

Role: Co-Investigator

Project overview: Leverage NLP and graph approaches to determine consistency of information between and within OMS/UCI standards, DoD doctrine, engineering (e.g., mission, digital, SoS, AI, etc.) methods, for an integrated DoD battlefield visualization of SA.

TRAIT: Transition-pipeline Recommender & Attrition Identification Tool
November 2021 - Present

SPONSOR: GLOBAL TECHNOLOGY CONNECTION, INC

Role: Principal Investigator

Project overview: As part of this NAVY SBIR we are focusing on the development of a model for attrition prediction in the naval aviation training pipelines and the development of a recommendation system for appropriate pipeline.

Model-Based Enterprise Architecture for Institutional Management Digital Twins
May 2021 - Present

SPONSOR: GLOBAL TECHNOLOGY CONNECTION, INC

Role: Principal Investigator

Project overview: As part of this NASA STTR we are focusing on the development of a structured, model-based approach to the definition and development of Institutional Management Digital Twins guided by architectural and Model Based Systems Engineering (MBSE) practices and principles.

Natural Language Processing for Requirement Engineering
June 2021 - Present

SPONSOR: BOEING RESEARCH & TECHNOLOGY

Role: Co-Investigator

Project overview: This research focuses on 1) the definition of appropriate, relevant and reliable requirements boilerplates, and 2) the development of a NLP tool that ingests requirements and outputs requirements that are more uniform/consistent, and semi or fully machine readable.

Data Visualization of Performance Ratings
October 2017 - Present

SPONSOR: CROWN CONSULTING, INC.

Role: Co-Investigator

Project overview: Support informed decision making regarding the continued operations of NASA ARMD's programs and projects through the development of decision environments to support 1) strategic thrust outcomes progress assessment, 2) progress towards major milestones assessment, and 3) NASA annual performance assessment. This includes the:
  - Identification, collection (in collaboration with ARMD's Cross-Program Analysis Manager), and integration of data relevant to the evaluation of programs and projects' progress towards accomplishing their goals.
  - Development of a series of interactive visualization environments that establish and provide an integrated view of the performance of programs/projects towards achieving the strategic Thrusts Outcomes and/or Critical Commitments.

Future Factory Manufacturing and Supporting Applications for Equipment and Process Health Monitoring
January 2020 - Present

SPONSOR: BOEING RESEARCH & TECHNOLOGY

Role: Co-Investigator

Project overview: Development and implementation of an analytical pipeline for real-time anomaly detection of manufacturing assets.

Model-Based Systems Engineering for Digital Manufacturing: A Proof-of-Concept
January 2021 - January 2022

SPONSOR: THE DIGITAL MANUFACTURING INSTITUTE (MxD)

Role: Co-Investigator

Project overview: This research focused on the development of a methodology aimed at capturing manufacturing and production system considerations in a model-based environment. In doing so, this research demonstrated how model-based systems engineering allows for the connection and integration of product design, manufacturing and production models and data through an authoritative source of truth (ASoT). In particular, manufacturing/production system model for a minimum viable product (UAV wing) were integrated within an existing digital enterprise to demonstrate the requirements validation and verification process, requirement traceability, and finally the ability to conduct tradeoff analyses between design, manufacturing and production concurrently.

Operations Optimization in the Context of a Pandemic
June 2021 - November 2021

SPONSOR: SIEMENS TECHNOLOGY

Role: Co-Investigator

Project overview: Developed an artificial environment based on the integration of contact networks, agent-based modeling and discrete-event simulation to test different strategies and optimize operational policies in the context of a pandemic.

Past Research Projects
2007 - 2021

- **Digital Enterprise Across the Lifecycle (Sponsor: Rolls Royce Corporation):** Developed an approach for a digital enterprise architecture that seamlessly integrate the virtual and physical worlds in each of the as-designed, as-built and as-used phases of a product's lifecycle. The *as-designed* phase covers conceptual and preliminary design as well as requirements tracking through MBSE. The *as-built* phase used CAD and PLM software to model and manufacture a proof of concept vehicle. Lastly, the *as-used* phase used physics-based models and empirical flight test data to predict and validate vehicle behavior. The communication between each phase was enabled trough a digital thread by means of Neo4j, a graph database. Through the definition and implementation of a digital enterprise across the lifecycle of a minimum viable product, the team was able to report on lessons learned, limitations, challenges and scalability of their approach to more complex problems.
- **Deep Data Fusion (Sponsor: Airbus Americas):** Achieved improved overall aerodynamics prediction capability by leveraging machine learning methodologies and algorithms under a variety of configurations (flow conditions and geometry). In particular 1) investigated geometric deep learning to represent complex aerodynamic field data and 2) developed a high-dimensional, multi-fidelity inference algorithm that leverages advances in the deep learning techniques (e.g. deep fake) to enable multi-fidelity deep data fusion of CFD and Wind Tunnel data.
- **Technology Mapping Methods using MBSE Techniques - Technology Platform for Campus Emergency Response (Sponsor: Georgia Tech Police Department):** Developed a model-based and data-driven approach for technology platform effectiveness assessment and decision support in future technology acquisition and integration with current platforms.
- **Impact of COVID-19 on the Aviation Industry (Sponsor: None-IRAD):** Identified and assessed a robust set of solutions to make aviation less sensitive to pandemics.
- **A System-of-Systems Approach to Human Displacement (Sponsor: In Collaboration with Drexel University):** Developed a platform enabled by a hybrid agent-based and system dynamic modeling approach to predict the destinations, magnitude, and resources required to support climate change migrants, with the ability to consider different policy and climate change scenarios.
- **Digital Twins for Combatting COVID-19 Spread in Enclosed Environments (Sponsor: Siemens Technology):** Developed data-calibrated, model-driven scenario analysis capabilities to assess means to enhance indoor systems and protocols to reduce the spread of viruses.
- **Turbulence Event Modeling & Prediction (Sponsor: Delta Airlines):** This research leveraged large amounts of digital flight data along with machine learning techniques to develop models to improve prediction of risk associated with in-flight turbulence events.
- **TRACAIR: TRAjectory Course Anomaly IdentifieR (Sponsor: Global Technology Connection, Inc):** The main objective of this research was to develop a flexible trajectory anomaly detection framework leveraging multi-source aviation data and deep learning techniques to aid in safety-critical decision-making in terminal airspace operations using relevant, interpretable metrics such as energy metrics. Major accomplishments included 1) the development of scalable data curation algorithms for data processing, cleaning, and fusion of various data sets, 2) the implementation of deep autoencoder anomaly detection models, and 3) the development of a flexible, interpretable visualization environment to further analyze anomalous trajectories and identify potential safety issues.
- **Aviation Research, Development Test and Evaluation - Smart Airport Use Cases & Prioritization & Microgrids (Sponsor: National Institute of Aerospace):** Conducted a technical assessment on the state of smart airport technologies. This assessment identified and prioritized a list of airfield use cases where smart airport technologies could benefit the traveling public. In particular, we developed a dashboard for technology prioritization and visualization which: 1) prioritizes technologies based upon user-defined weightings with respect to cost, benefit, risk and Technology Readiness Level (TRL), 2) identifies synergies across use cases, and 3) identifies where the industry is going and whether this aligns or not with FAA's Research Programs
- **Foundation of a Digital Twin for Buildings & Microgrids (Sponsor: Siemens Technology):** Developed a simulator for building/microgrid interactions that allows to balance electrical energy supply and demand for existing building systems and help evaluate how the size of energy system components (batteries, EVs, PVs) affects both cost and resiliency. Major accomplishments included the development of a data-calibrated, model-driven scenario analysis of a system comprising a commercial office building and electricity microgrid components.
- **Siemens Insight (Sponsor: Siemens Technology):** Developed a comprehensive, scalable and repeatable open-source solution that enables the seamless 1) creation of digital models of buildings and 2) integration of agents' behavior within the building's digital profile such as to extend the digital profile of the building to an experimental environment where digital residents live, work, interact. Major accomplishments included the development of a digital twinning environment which involves 1) the development of Digital Building Profile of a building of interest, 2) research on automatic parsing techniques for architectural floorplan, 3) the application of agent-based modeling techniques to create digital residents model, 4) the application of machine learning techniques to enable predictive analytics on digital building profile, 5) the design of an integrated GUI that presents a digital profile of target building. The developed environment was demonstrated to Siemens that highlighted the following capabilities: 1) semi-automatic conversion of raster floorplan to digital vectors, 2) site-specific ABM simulation capability, 3) built-in ML pipeline for arbitrary data table with automatic weather data acquisition via web scraping, and 4) integrative 3D dashboard with 2D/3D web visualization.

- **Floor Covering MBSE (Sponsor: Airbus Americas):** The objectives of this research were three-fold: 1) develop automated floor covering from customer definition to manufacturing, 2) build a MBSE model to define parametric constraints per customer definition, and 3) develop a single process for Linefit and Retrofit. Major accomplishments included streamlining the flow of data from PaceLab Cabin to engineering drawings for the Non-Textile Floor coverings (NTF) in Zone 1 of the widebody A350 Aircraft. In particular, we developed an MBSE Airbus Cabin Configuration parametric floor NTF model using the CATIA tool within the Dassault Systèmes 3DEXPERIENCE platform and formulated a conceptual process for automating the creation of Aircraft Architecture Blocks from Pacelab data as well a conceptual process for data flow from CAMEO to 3DX.
- **Reducing airline safety risk through the identification of critical flight parameters and predictive modeling (Sponsor: Delta Airlines):** Developed a framework to support the identification of critical parameters for flight event safety.
- **Future Factory Manufacturing and Supporting Applications for Equipment and Process Health Monitoring (Sponsor: Boeing Research & Technology):** Developed and validated future factory manufacturing and supporting applications for equipment and process health monitoring. In particular, developed a methodology for creating data-driven digital twins of production-critical assets at various Boeing facilities. Majors accomplishments included 1) the development of a structured and scalable approach for the benchmarking of deep learning architectures for machine tool anomaly detection that: a) provides a comprehensive end-to-end process from data collection to inference of machining tool health, b) supports the identification of the best type(s) of architecture for the identification of cutting tool condition for a machine of interest, c) provides a rigorous assessment of the benefits and drawbacks of considering different types of features on the models' performance and inference abilities, d) provides insight into the level of model accuracy one may achieve given the nature and source of the data available and 2) the development of a deployable approach for unlabeled data and unsupervised learning that identifies machine operation standard modes as well as identifies anomalies using models trained on nominal data only.
- **Continuation of Formulation, Development and Implementation of MBSE Enabled Processes for Aircraft Design (Sponsor: Airbus Americas):** Leveraged existing tools and Airbus knowledge to develop a more comprehensive assessment of uncertainty in CG measurement. Major accomplishments included the development of a tool that quantifies uncertainty in aircraft weight and CG for a variety of user-defined aircraft and can be used to 1) understand the impact of passenger loading factors, cargo loading sequence, fuel, etc. on the aircraft weight and CG, and 2) identify the major contributors of CG uncertainty.
- **Increasing Aviation Safety through Machine Learning (Sponsor: Delta Airlines):** Leveraged data-driven techniques for early identification of flight safety risk. In particular, developed a robust and repeatable methodology to 1) categorize heterogenous flight data, 2) systematically reduce the number of parameters through correlation analysis, parameter categorization, and subject matter expert review, 3) determine the optimal clustering algorithm and number of clusters for a given feature vector, and 4) identify critical parameters that drove the cluster formation and ones that are indicative of anomalies.
- **Supply Chain Resilience to Support the Warfighter (Sponsor: Rolls Royce Corporation):** Developed a methodology adaptable to any supply chain that 1) allows for the comparison of mitigation techniques depending on user preferences, and 2) provides an understanding of the impact that mitigation techniques have for different scenarios.
- **Automated Surrogate Modeling (Sponsor: Siemens Technology):** Developed a novel methodology, founded on sound mathematical and statistical theory, that automatically constructs and tunes a surrogate model of the input-output relationship for a complex system that is expensive to simulate. Majors accomplishments included: 1) a detailed empirical evaluation of DGP models, and 2) the development of a novel method called Deep Auto Tune (DAT) that can automatically tune any surrogate model with deep architectures.
- **Automated Knowledge Extraction & Representation (Sponsor: Siemens Technology):** Developed of a methodology, founded on strong mathematical principles, that enables the automatic extraction and representation of design knowledge such that the extracted knowledge can be utilized by a learning agent to aid, automate, or replace design engineers in new, but related, scenarios in Siemens NX. Major accomplishments included 1) the development of an overarching framework to be used as an in-product recommendation engine based on a machine learning approach (including: a- Imitation learning using a mathematical framework of 'Deep-Q learning from Demonstration', b- Unique 'state' encoding based on natural language processing, c- An encoding method using 'soft' classification of 'features', d- In-product recommendation considering feature hierarchy, e- Subsidiary supervised learning for parameter prediction considering design specification and requirements) and 2) the development of a recommendation interface to guide the user when developing a model within NX.
- **Future Factory Manufacturing and Supporting Applications for Equipment and Process Health Monitoring (Sponsor: Boeing Research & Technology):** Developed elements of a digital twin to compare as built data from a numerical control machine to as designed characteristics of the machine from manufacturer specifications. Major accomplishments included: 1) the formulation of an approach to developing a digital twin of a lathe machine, 2) the exploratory analysis of machine data, 3) the modeling of the subsystems and related physics involved using Modelica, 4) the verification, calibration and validation of the Modelica model through virtual experimentation, and 4) the development of a predictive model of surface roughness.
- **Architecting of Digital Twin Vision through Use Case Formulation (Sponsor: Airbus Americas):** Formulation of an MBSE enabled digital twin framework and architecting of an overall digital twin vision for the following activities: in-flight net thrust determination, in-flight C.G. determination and fiber optic sensing.
- **Designing for Manufacturing Process Capability (Boeing Research & Technology):** Development and validation of process-based manufacturing modeling to predict the manufacturability and potential defects in a part, and link this capability to the early design process.
- **FAA Data Fusion (Federal Aviation Administration):** The objective of this research was two-fold: 1) Support the FAA through the development of a data fusion framework aimed at facilitating the analysis of aviation Big Data, and 2) Transfer the developed data fusion framework to the FAA for integration into their data sharing environment. major accomplishments included 1) the integration of multiple datasets into an Hadoop environment running on a virtual machine, 2) the development of parsers for SFDPS and TFMS and 3) the visualization of use cases in Tableau.

- **Benefit Assessment for Mission Adaptive Digital Composite Aerostructure Technology (MADCAT) (Sponsor: Crown Consulting, Inc.):** Conducted a benefit assessment of one of NASA CAS exploratory studies, Mission Adaptive Digital Composite Aerostructure Technologies (MADCAT), and provided NASA with system benefit projections (real-world potential). Major accomplishments included 1) the realization of a qualitative design study to identify potential needs to bring the MADCAT technology to the next level, and 2) the assessment of life cycle cost benefits brought by MADCAT by comparing a Cirrus SR-22 equivalent wing model using a conventional aluminum design and manufacturing technologies with one using a voxel lattice.
- **Low Cost Attritable Aircraft (LCAA) - Extension of Structural/Manufacturing Modeling & Analysis Capabilities (Sponsor: Air Force Research Laboratory):** The objective of the research was to expand the detailed structural modeling capabilities developed in 2016-2017 to include fuselage and tail components to explore low-cost manufacturing techniques and materials. Major accomplishments includes 1) the development of a fuselage class in RADE that enables the external wing and tail component dependencies to be referenced and for an assembly hierarchy to be created that can then be leveraged to facilitate the auto-generation of the SEER model hierarchy, 2) the development of RADE python classes to translate RADE hierarchy and component data into SEER model components/rollups, 3) the integration of SEER within RADE to enalble a complete performance and cost analysis to be performed within RADE, and 4) the investigation and assessment of the potential, in terms of weight, cost and manufacturing time, of reducing safety factors for attritable vehicles.
- **Low Cost Attritable Aircraft (LCAA) – Attritable Sensor Trade Space Exploration:** The objective of the research was to evaluate the necessary sensor performance and cost for Attritable UAVs to operate effectively. The research focused on three key areas: 1) The development of an adaptive agent behavior model 2) The development of a SoS-level battle manager 3) The parametric modeling of sensor costs. Major accomplishments included 1) the development of elements to serve as a AUAV battle manager, 2) the development of adaptive behavior scoring scheme, and 3) the development of sensor performance and cost models.
- **NASA ARMD's Plan for Technology Innovation and Convergence/Divergence (Sponsor: Crown Consulting, Inc.):** Development of a repeatable methodology to identify opportunities for NASA ARMD and the Convergent Aeronautics Solutions (CAS) project to meet ARMD's objective of transforming aviation through convergence between aeronautical technologies and advances in the non-aviation world. Major accomplishments include 1) Supported the formulation and development of a methodology aimed at identifying opportunities for technology convergence related to future concepts for aviation systems, 2) Helped defined the technology landscape for four topics of interest to NASA ARMD: On-demand mobility (ODM), Flow control to reduce air vehicle noise, Advanced concepts for VTOL air vehicle propulsion, Advanced technologies affecting the system architecture for the future Air Traffic Management eXploration (ATM-X) concept, and 3) Performed a semantic similarity analysis to identify technologies within the ODM-related technology landscape that have high potential for convergence and high relevance to ARMD outcomes established in the NASA Aeronautics Strategic Implementation Plan.
- **NASA Comprehensive Digital Transformation - Atmospheric Data Study (Sponsor: NASA Langley Research Center - Climate Science Branch):** Leveraged data fusion and machine learning techniques to support the construction of 3D domains of cloud properties using both passive imagery and active satellite sensors data. Major accomplishments included 1) Improved predictive capabilities of existing model, 2) the investigation of additional applicable ML techniques and 30 the integration of atmospheric information into the model.
- **The Digital Factory of the Future: 88-19 Quadbot Study (Sponsor: Boeing Research & Technology):** The objective of this research was to support the planning, execution and analyses of scenarios of interest by developing components that serve as a digital factory founded on the integration of data-driven and simulation models. Major accomplishments includes: 1) Data Exploration and Visualization: Developed a process browser to support data exploration 2) Developed logic and algorithm to automatically generate sequence of events, and identify the event/states or sequences of events/states that contribute the most to process time 3) Leveraged machine learning algorithms to predict the occurrence of triggering events, and predict process time using planned parameters and the predicted occurrence of triggering events as input to the predictive model 3) Delay modeling: Developed delay models for tool change, fastener ejection, movement, and collar installation 4) Simulation: Developed a discrete-event simulation model that integrates the data-driven predictive models developed as part of the root cause analysis to run scenarios and optimize cell execution 5) Developed a technique for optimizing the NC programming sequence 6) Leveraged the Simio simulation model to evaluate the performance of an identified viable sequence.
- **NASA's Aeronautics Research Progress towards Planned Strategic Community Outcomes (Sponsor: Crown Consulting, Inc.):** Development of an interactive dashboard to support the portfolio analysis of NASA's Aeronautics research progress toward planned community strategic outcomes .
- **Low Cost Attritable Aircraft (LCAA) Product Line Cost-Capability Analysis (Sponsor: Air Force Research Laboratory):** Development of a methodology and framework integrating Conceptual Design, Operations Analysis, Cost Estimation & Manufacturing Modeling to enable the identification and design of capable, cost-effective platforms. Major accomplishments includes: 1) Developed and implemented a design methodology that parametrically integrates operations analysis, vehicle sizing, and manufacturing and cost estimation disciplines into one multidisciplinary framework to support the development of capable and cost-effective Systems of Systems or Architectures 2) Demonstrated trades at discipline level (AC Conceptual Design and Sizing:, Operations Analysis, Manufacturing and Cost Modeling 3) Demonstrated ability to compare cost/target between architectures 4) Conducted commonality studies across four distinct design variants to assess impact of economies of scale.
- **The Digital Factory of the Future: A Cyber-Physical Transformation Perspective (Sponsor: Boeing Research & Technology):** Development and integration of data-driven and simulation models to support reactive scheduling and mitigate the impact of delays and disruptions at the cell and system levels. The objectives of this particular research were to 1) study the flex track and side of body drilling systems to define and model relationships at the cell and factory levels and 2) offer predictive analysis to measure the impact of certain features to the production system in order to enable more informed scheduling, and identify disruption mitigation strategies. The capabilities developed and transitioned to the Sponsor included an overarching simulation model that integrated both a scheduling and a drilling model as well as a data-driven predictive model for the cycle time of individual drilling jobs.

- **Concurrent UAS Family and Flexible Factory Design (Sponsor: None):** Incorporated flexible factory design within an UAS conceptual design framework to identify design parameters and manufacturing technologies that reduce cost, increase flexibility, and improve market coverage.
- **A Visual Analysis through Linguistic Mapping (Sponsor: Georgia Tech):** Application of text mining techniques and visual analytics best practices to enable the development of a visualization environment that helps: 1) visualize gaps between sustainable courses and sustainable research as defined by the QEP keywords, and 2) understand relationships between the data to identify clusters of research areas, opportunities to grow in areas, and support the development of new degree programs.
- **Production Flow Analysis for a Space Launch System (Sponsor: Boeing Research & Technology):** Development of a methodology and tools to support the integration of a large number of external and internal sensors on the Engine Section and Intertank of the Space Launch System (SLS). This included the development of production models, sensor installation logic, optimization algorithms and decision support environment. In particular, the decision support environment allowed for the identification and prioritization of sensor installation schedules that reduce the impact on manufacturing flow time, man-hours, etc. It supported the down-selection of Pareto optimal sensor installation plans by: 1)Providing the ability to compare scenarios from the system-level down to the individual process-by-process level, 2) Increasing transparency and trust in the planning process by allowing the decision makers to understand how the simulation is completing sensor installations, and 3) Incorporating the planner's knowledge by facilitating down-selection, intelligent plan modification, and automatic evaluation of the modified plan.
- **Manufacturing Influenced Design (MInD) & Parametric Analysis for Aircraft Production Flow (Sponsor: Boeing Research & Technology):** Development of a framework, and interactive & parametric visual environment, to support decision making and enable rapid trade studies and concept selections at early design stages. In particular, investigated the impact of: 1) production planning on aircraft design, 2) demand variability on production planning and aircraft design and 3) manufacturing variability on production planning and aircraft design.
- **Unmanned Aircraft Systems in the National Airspace System (Sponsor: LMI):** Development of an evaluation framework to help assess the impact of regulatory & technological requirements on UAS/NAS performance and safety, and support the future integration of UAS in the NAS.
- **NASA ARMD Analysis Framework (AAF) Database Prototyping and User Support (Sponsor: Crown Consulting Inc.):** Development of a web-based visualization environment that leverages the NASA Aeronautics research Mission Directorate (ARMD) Analysis Framework (AAF) to support the exploration and analysis of research portfolios and better support strategic planning.
- **Value Assessment of Enhanced Capabilities (Sponsor: Airbus):** Investigate approaches to quantify the benefit of infusing new design methods or tools into the design process; Provide a quantitative assessment of conceptual design errors and their impact on detailed design; Provide a statistical approach to estimating rework cost.
- **Business Process Management (BPM) Tools and Processes (Sponsor: Canadian Navy):** Development of a business process management relational framework to improve the existing HR management framework; Facilitate the active and effective management of approved work, delivered efficiently, on time and on budget; Provide performance measurement of planned work against key performance indicators and highlight problem areas; Better align competency and capacity with customer requirements and forecast demand.
- **Dassault Systemes' Winning Program (Sponsor: Dassault Systemes):** Support Dassault Systemes' understanding of a UAS conceptual design process; Help demonstrated the capability of the DS Winning Program (WP) tool suite to support such process from A to Z.
- **Airborne Wind Electric Generator (AWEG):** Evaluation of the design and technical feasibility of a 1MW airborne wind electric generator operating at altitudes up to 20,000 feet or even higher (for special use or restricted airspace)
- **Modeling of Vehicle Environmental Characteristics Including New Technologies/Concepts for the Next Generation Air Transportation System (Sponsor: NASA):** Definition and development of a public registry in support of the strategic development of NextGen architectures within NASA Research Announcement (NRA) "Modeling of Vehicle Environmental Characteristics Including New Technologies/Concepts for the Next Generation Air Transportation System".
- **Aviation environmental Portfolio Management Tool (APMT) (Sponsor: FAA):** Supported the development of the Aviation environmental Portfolio Management Tool (APMT) in contract work for the Federal Aviation Administration (FAA) in support of the International Civil Aviation Organization (ICAO).

INVITED TALKS & PRESENTATIONS

AIAA Air Transportation Systems Technical Committee Education and Outreach Webinar Series

AIAA

INVITED SPEAKER   *January 2022*

- Presentation Title: *Applications of AI/ML to Air Transportation Challenges*

Today's Opportunities and Challenges of Data Science in Engineering

NAFEMS

INVITED SPEAKER   *December 2021*

NASA Goddart IS&T Colloquium Lecture Series

NASA

INVITED SPEAKER   *November 2021*

- Presentation Title: *Cyber-Physical Digital Twins – Georgia Tech Smart Campus Cases Studies*

EASA-FAA Additive Manufacturing Workshop *EASA-FAA*

Invited Speaker *November 2021*

- Session Title: Computer Modelling and Simulation
- Presentation Title: *Digital Twin & Digital Thread – Definition, Value & Relevance to Certification*

Technical Panel: Digital Airworthiness *AA&S21*

Invited Speaker *August 2021*

Keystone Panel: Digital Certification *AA&S21*

Invited Speaker *August 2021*

AI, Data Driven Models & Machine Learning: How Will Advanced Technologies Shape Future Simulation Processes *NAFEMS*

Invited Speaker *April 2021*

- Panel Title: State of Explainable AI/ML

Forum 360 - Model-Based Everything: Design Faster! *AIAA SciTech 2021 Forum*

Invited Speaker *January 2021*

- Presentation Title: *Model-Based Institutional Management - Georgia Tech Smart Campus Case Studies: Cyber-Physical Digital Twins*

Technical Panel: The Impact of Model-based Design Technology and Methods *AIAA SciTech 2021 Forum*

Invited Speaker *January 2021*

- Presentation Title: *Model-Based Design of Complex Systems Through the Concept of Digital Twin*

Achieving Pervasive Engineering Simulation: 2020-2030 - Exploring the Impact of Systems Thinking & Model-Based Engineering *NAFEMS*

Invited Speaker *November 2020*

- Webinar Title: AI, Data Driven Models & Machine Learning: How Will Advanced Technologies Drive Future Simulation Processes?
- Presentation Title: *AI/ML & Engineering Design*

PUBLICATIONS

Book Chapters

- D. N. Mavris and <u>O. J. Pinon</u>, *A Systems Engineering Approach to Aircraft Design*, in Encyclopedia of Aerospace Engineering, eds R. Blockley and W. Shyy, John Wiley: Chichester, doi:10.1002/9780470686652.eae597, Published June 15th, 2012

Policy/Position Papers

- AIAA Digital Engineering Integration Committee (DEIC), *Digital Thread: Definition & Value - An AIAA and AIA Position Paper*, <u>Under Review</u>
- AIAA Digital Engineering Integration Committee (DEIC), *Digital Twin: Reference Model, Realizations & Recommendations - An AIAA and AIA Position Paper*, <u>Under Review</u>
- AIAA Digital Engineering Integration Committee (DEIC), *Digital Twin: Definition & Value - An AIAA and AIA Position Paper*, December 2020, https://www.aiaa.org/advocacy/Policy-Papers/Institute-Position-Papers

Standards

- American Institute of Aeronautics and Astronautics, *Recommended Practice: When Flight Modelling Is Used to Reduce Flight Testing Supporting Aircraft Certification (AIAA R-154-2021)*, April 2021, https://doi.org/10.2514/4.106231

Journal Papers

- E. Mangortey, <u>O.J. Pinon Fischer</u> and D.N. Mavris, *Application of Machine Learning to the Analysis and Assessment of Airport Operations*, Journal of Aerospace Information Systems, December 2021, https://doi.org/10.2514/1.I011030
- T. Dussauge, W.J. Sung, <u>O. Pinon Fischer</u> and D. N. Mavris, *A Reinforcement Learning Approach to Airfoil Shape Optimization*, **Under review** for publication in ISA Transactional Journal
- S. Corrado, T.G Puranik, <u>O.J. Pinon Fischer</u> and D.N. Mavris, *A Clustering-based Quantitative Analysis of the Interdependent Relationship between Spatial and Energy Anomalies in ADS-B Trajectory Data*, Transportation Research Part C: Emerging Technologies, Vol 131, October 2021, https://doi.org/10.1016/j.trc.2021.103331
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- C. P. Frank, R. A. Marlier, O. J. Pinon Fischer and D. N. Mavris, *Evolutionary Multi-Objective Multi-Architecture Design Space Exploration Methodology*, Optimization and Engineering, January 2018, Volume 19, Issue 2, pp 359-381, https://doi.org/10.1007/s11081-018-9373-x
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- O. J. Pinon, D. N. Mavris and E. Garcia, *Harmonizing European and American Aviation Modernization Efforts through Visual Analytics*, Journal of Aircraft, Vol. 48, No.5., pp 1482-1494, September-October 2011, doi:10.2514/1.56055

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- M. Emara, M. dos Santos, N. Chartier, J. Ackley, T.G. Puranik, A. Payan, M. Kirby, O.J. Pinon, D.N. Mavris,*Machine Learning Enabled Turbulence Prediction Using Flight Data for Safety Analysis*, 32nd Congress of the International Council of the Aeronautical Sciences (ICAS), Shanghai, China, 7-10 September 2021
- M. Cook, S. Swanson, M. Balchanos, S. Duncan, O.J. Pinon Fischer and D.N. Mavris, *Parametric Exploration of Microgrid Components and Implications to the Creation of a Digital Twin*, AIAA Propulsion & Energy Forum and Exposition, Virtual Event, August 9-11, 2021, AIAA-2021-3372, https://doi.org/10.2514/6.2021-3372
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- E. Mangortey, T.G. Puranik, <u>O.J. Pinon Fischer</u> and D.N. Mavris, *Classification, Analysis, and Prediction of the Daily Operations of Airports Using Machine Learning*, AIAA SciTech Forum, Orlando, Florida, January 6-10, 2020, AIAA-2020-1196, https://doi.org/10.2514/6.2020-1196
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- E. Mangortey, G. Dard, <u>O. J. Pinon</u> and D. N. Mavris, *Application of Data Fusion and Machine Learning to The Analysis of the Efficiency of Recommended Flight Reroutes*, to be presented at the 2019 AIAA Aviation and Aeronautics Forum and Exposition, Dallas, TX, 17-21 June, 2019
- E. Mangortey, <u>O. J. Pinon</u> and D. N. Mavris, *Predicting The Duration and Updates to The Duration of Weather and Volume Related Ground Delay Programs*, to be presented at the 2019 AIAA Aviation and Aeronautics Forum and Exposition, Dallas, TX, 17-21 June, 2019
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- J. E. G. Pagan, D. Huynh, S. R. Schafer, <u>O. J. Pinon Fischer</u> and D. N. Mavris,*Enabling Multi-Disciplinary Cost Effectiveness Tradeoffs in the Design of Attritable Systems of Systems*, 86th MORS Symposium, Monterey, CA, June 19-21 2018
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- <u>O. Pinon Fischer</u> and W.J. Sung, *AI, Data-driven Models & Machine Learning - What Next?*, Benchmark - The International Magazine for Engineering Designers & Analysts from NAFEMS, January 2021

Invention Disclosures / Patents

- *Automated Knowledge Extraction and Representation (AKER) for Decision Support in Complex Engineering Design Systems*, June 2020, Application No. 63/033,867

Report Contributions

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- Floor Covering MBSE, Final report delivered to Airbus, 106 p., May 2020
- Future Factory Manufacturing and Supporting Applications for Equipment and Process Health Monitoring – Digital Twin Task, Final report delivered to The Boeing Company, St. Louis, MO, December 2019
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TEACHING

AE6372 - Aerospace Systems Engineering
Fall 2021

GEORGIA INSTITUTE OF TECHNOLOGY

Departments: School of Aerospace Engineering
Lecture Title: (Digital) Manufacturing-Influenced Design - Past & Current Efforts

CP8873 C/AE8803-SCW - Smart City Workshop
Fall 2020, Fall 2021

GEORGIA INSTITUTE OF TECHNOLOGY

Departments: School of City and Regional Planning, School of Aerospace Engineering, School of Architecture
Lecture Title: Digital Twins

INDIVIDUAL STUDENT GUIDANCE

Ph.D. Qualifying Exam Committee Serving/Served On

- James Pagan (CSE) - Fall 2019

Ph.D. Committees Serving/Served On

- **Michael Herman**, Ph.D. thesis supervision, Title: *Digital Twin Predictive Calibration Methodology for APS Sun Sensor using Convolutional Neural Network-Based Regression*, Expected Graduation: Spring 2023
- **Rahul Rameshbabu**, Ph.D. thesis supervision
- **Archana Tikayat Ray**, Ph.D. thesis supervision, Title: *Natural Language Processing for Requirement Engineering*, Expected Graduation: Spring 2023

- **Esma Karagoz**, Ph.D. thesis supervision, Title: *A Decision Advisor Framework for Model-Based Systems Engineering*, Expected Graduation: Fall 2022
- **Aroua Gharbi**, Ph.D. thesis supervision, Title: *A Robust Methodology for Reuse Activities in SysML*, Expected Graduation: Fall 2022
- **Domitille Commun**, Ph.D. thesis supervision, Title: *An Approach for UAV-enabled Surveillance Camera Calibration in Various Environments*, Graduated Fall 2021
- **Dushhyanth Rajaram**, Ph.D. thesis supervision, Title: *On Methodologies for Construction of Surrogates for Computationally Expensive High-Dimensional Problems*, Graduated Fall 2020
- **Eugene Mangortey**, Ph.D. thesis supervision, Title: *Development of a Big Data framework for the Classification, Analysis and Prediction of the Daily Operations of Airports*, Graduated Fall 2020
- **Yanal Isaac**, Ph.D. thesis supervision, Title: *A Quaternion Approach to the Model Analysis and Reduced-Order Modeling of Three-Dimensional Fluid Systems*, Graduated Summer 2020
- **Ethan T. Minier**, Ph.D. thesis supervision, Title: *An Improved Methodology for Designing Environments Subject to Unpredictable and Evolving Conditions: A Manufacturing Application*, Graduated May 2019
- **Burak Bagdatli**, Ph.D. thesis supervision, Title: *Architecture-based Selection of Modeling Type for System of Systems Analysis*, Graduated Fall 2018
- **Seth L. Libby**, Ph.D. thesis supervision, Title: *Framework for Product Architectural Analysis of Unmanned Systems and Technologies*, Graduated Fall 2017
- **Dennis J.L. Siedlak**, Ph.D. thesis supervision, Title: *Robust Scheduling Methodology to Reduce Risk in Aerospace Production Systems*, Graduated Fall 2016
- **Christopher P. Frank**, Ph.D. thesis supervision, Title: *A Design Space Exploration Methodology to Support Decisions Under Evolving Uncertainty in Requirements and Its Application to Advanced Vehicles*, Graduated Fall 2016
- **Tyler R. Milner**, Ph.D. thesis supervision, Title: *A Risk-Informed Manufacturing-Influenced Design Framework for Affordable Launch Vehicles*, Graduated Spring 2016
- **Alicia Sudol**, Ph.D. thesis supervision, Title: *A Methodology for Modeling the Verification, Validation, and Testing Process for Launch Vehicles*, Graduated Fall 2015
- **Ludovic F. Hivin**, Ph.D. thesis supervision, Title: *Sustainability of Multimodal Intercity Transportation using a Hybrid System Dynamics and Agent-Based Modeling Approach*, Graduated Fall 2014

M.Sc Committees Serving/Served On

- **Darrin Winecoff** , M.Sc. thesis supervision, Title: *A Systems Approach to Biomimetic Product Design*, Expected Graduation: Summer 2022
- **Ian Marks**, M.Sc. thesis supervision, Title: *Multi-Agent Digital Twin-Enabled Activity Management*, Expected Graduation: Summer 2022
- **Agathe Boutaud**, M.Sc. thesis supervision, Title: *Sizing Long-Term Space Habitats*, Graduated Fall 2019
- **Eugene Mangortey**, M.Sc. thesis supervision, Title: *Decision Support Tool for Predicting the Duration and Coincidence of Ground Delay Programs and Ground Stops using Machine Learning*, Graduated Spring 2019
- **Ghislain Dard**, M.Sc. thesis supervision, Title: *Application of Data Fusion in the Analysis of the Relevancy of Recommended Flight Reroutes*, Graduated Spring 2019
- **Domitille Commun**, M.Sc. thesis supervision, Title: *Investigation of Pedestrian Safety on Campus Intersections*, Graduated Spring 2019
- **Manon Huguenin**, M.Sc. thesis supervision, Title: *Development and Validation of 3D Cloud Fields Using Data Fusion and Machine Learning Techniques*, Graduated Fall 2018
- **Florence Duveiller**, M.Sc. thesis supervision, Title: *A Methodology to Support Relevant Earth-Mars Communication Architecture Comparisons*, Graduated Fall 2018

AE8900 Supervision

- **Steven Schafer**, MSc student, Special Problem supervision, Title: *A Review of the State of the Art in Flight, Ground, and Wind Tunnel Testing*, Summer 2021
- **Marcos dos Santos**, MSc student, Special Problem supervision, Title: *Parametric Structural Analysis Tool to Support Composite Manufacturing and Production of a UAV Wing*, Summer 2021
- **Martin Delage**, MSc student, Special Problem supervision, Title: *A System-of-Systems Approach to Human Displacement*, Summer 2021
- **Sean R. Gilfether**, MSc student, Special Problem supervision, Title: *Agent-Based Modeling of Communities to Support Analysis of Epidemic Spreading*, Summer 2020
- **Xiao Jing**, MSc student, Special Problem supervision, Title: *New Parallel Computing Strategy for the Large-scale Agent-Based Simulation of Pandemic-response Scenarios*, Summer 2020
- **Y. Ogun Kargin**, MSc student, Special Problem supervision, Title: *Production System Modeling for Production System Digital Twin*, Summer 2020
- **Ashely Barnes**, MSc student, Special Problem supervision, Title: *Digital Twin in the Digital Enterprise*, Summer 2020
- **O. Deniz Uysal**, MSc student, Special Problem supervision, Title: *Graph Database as a Digital Enterprise Infrastructure*, Summer 2020
- **Thomas Dussauge**, MSc student, Special Problem supervision, Title: *Reinforcement Learning for Airfoil Shape Optimization*, Spring 2020
- **Esma Karagoz**, MSc student, Special Problem supervision, Title: *Requirements Similarity Analysis using Natural Language Processing in a MBSE Context*, Fall 2019
- **Efe Yarbasi**, MSc student, Special Problem supervision, Title: *A Semantic Analysis of Scientific Publications*, Summer 2019

- **Gabriel Achour**, MSc student, Special Problem supervision, Title: *Development of a Generative Design Framework using Deep Learning for Airfoil Design Application*, Spring 2019
- **Jerome Gilleron**, MSc student, Special Problem supervision, Title: *Requirement Analysis and Mapping for a Semi-Autonomous Robotic Assembly of a Moon Surface Base*, Spring 2019
- **Joshua Price**, MSc student, Special Problem supervision, Title: *Methods to Define Optimal Agent Behavior Using Reinforcement Learning*, Spring 2018
- **Vu Ngo**, MSc student, Special Problem supervision, Title: *Improving Data Quality and Data Mining Process for Vertical Cloud Prediction Models with Higher Resolution Data*, Fall 2017
- **Chelsea Johnson**, MSc student, Special Problem supervision, Title: *Generating 3D Cloud Fields through Prediction Using A-Train and Machine Learning Techniques*, Summer 2017
- **J. Christian Buhr**, MSc student, Special Problem supervision, Title: *Expanding OA Capabilities of RAAGE through the Development of a SEAD Scenario*, Summer 2017
- **Dat Huynh**, MSc student, Special Problem supervision, Title: *Extending the Manufacturing/Cost Estimation Capabilities of the RAAGE Methodology*, Summer 2017
- **David Solano**, MSc student, Special Problem supervision, Title: *Development of an Agent Based Simulation Model of a Complex Automated Aircraft Assembly Line*, Spring 2017
- **Preet Dulla**, MSc student, Special Problem supervision, Title: *Model Based Engineering Architecture Development for a Manufacturing Environment*, Fall 2015
- **Paul Schlais**, MSc student, Special Problem supervision, Title: *Sensitivity of Performance and Production Constraints on Optimal Wing and Factory Design Choices*, Fall 2014
- **Celine Bonicel**, MSc student, Special Problem supervision, Title: *Bringing Manufacturing Variability Considerations into Design Concept Selection and Production*, Fall 2014
- **Ethan T. Minier**, MSc student, Special Problem supervision, Title: *Optimization and Assessment of Variable Production Manufacturing Environments*, Summer 2014
- **Young Jin Kim**, MSc student, Special Problem supervision, Title: *Parallel Agent-Based Modeling and Simulation of Air Traffic Network*, Summer 2014
- **Ben Murdock**, MSc student, Special Problem supervision, Title: *Manufacturing Influenced Design Production Ramp-up Analysis*, Summer 2014
- **Amanda Heckwolf**, MSc student, Special Problem supervision, Title: *Integration of Demand Variability into Composite Aircraft Factory Cost Predictions Using Manufacturing Influenced Design (MInD)*, Spring 2014
- **Dennis J.L. Siedlak**, MSc student, Special Problem supervision, Title: *Exploration of Production Flow Time and Efficiency's Impact on Aircraft Design* , Fall 2013
- **Todd Schmidt**, MSc student, Special Problem supervision, Title: *Manufacturing Influenced Design Production Optimization Cost Estimation*, Fall 2013

SERVICE

Professional Contributions

NATO MSG-ET-053 *January 2022 - Present*

MEMBER

Member of the Exploratory Team on *Allied Interoperability and Standardization Initiatives for Digital Twins*

ASME Digital Twin Advisory Board *January 2022 - Present*

MEMBER

Help develop the technical program for the ASME Digital Twin Summit to be held in May 2022 at Georgia Tech

OMG Digital Twin Consortium Aerospace-Defense Working Group *December 2021 - Present*

MEMBER

Liaison for the AIAA Digital Engineering Integration Committee

NAFEMS Engineering Data Science Working Group (EDSWG) *March 2021 - Present*

INVITED MEMBER

One of the objectives of this working group is to develop guidance and information to benefit the simulation community on the topic of Engineering Data Science

AIAA Digital Engineering Integration Committee (DEIC)   *2018 - Present*

MEMBER

- DEIC Secretary (January 2022 - Present)
- Co-chair, Digital Twin Subcommittee (2020-2022)
- Member of Leadership Team and Lead Author on the AIAA/AIA-approved Position Paper titled *Digital Twin: Definition and Value*
- Member of Leadership Team and Lead Author on the AIAA/AIA Position Paper titled *Digital Twin: Reference Model, Realizations & Recommendations*
- Member of Leadership Team and Lead Author on the AIAA/AIA-approved Position Paper titled *Digital Thread: Definition and Value*
- Technical Chair for AIAA SciTech 2022 and Aviation 2022

AIAA Design Engineering (DE) Technical Committee   *2020 - Present*

MEMBER

- Technical Chair for AIAA SciTech 2021, Aviation 2021, SciTech 2022, Aviation 2022, SciTech 2023
- Member of Award Committee (2020)

AIAA Air Transportation Systems (ATS) Technical Committee   *2007 - Present*

MEMBER

AIAA Integration Group (Integration and Outreach Division)   *January 2022 - Present*

MEMBER

AIAA Certification by Analysis Community of Interest (CQbA COI)   *2019 - 2020*

MEMBER

- Member of the Leadership Team
- Contributor and Editor of the Recommended Practice document titled *Recommended Practices When Flight Modeling is Used to Reduce Flight Testing Supporting Aircraft Certification* (https://doi.org/10.2514/4.106231)

International Council of the Aeronautical Sciences (ICAS)   *2019 - Present*

MEMBER

- Member of the Programme Committee
- Member of the Technical Task Force: Support the organization of the ICAS 2021 Congress as a hybrid event

Reviewer

MULTIPLE JOURNALS

Reviewer for AIAA Journal, ISA Transactions, Wiley Systems Engineering, IEEE Systems Journal, Transactions on Intelligent Transportation Systems, Research in Engineering Design, Journal of Aircraft, Applied Computing and Informatics, MDPI

Session Chair

MULTIPLE CONFERENCES & EVENTS

- AIAA SciTech Forum 2022 & Past AIAA SciTech and Aviation conferences
- NAFEMS World Congress, 25-29 October 2021
- ASDL External Advisory Board (EAB) - 2020, 2019, 2018, 2017, 2016
- 31st Congress of the International Council of the Aeronautical Sciences (ICAS), 2018
- Organizing chair, 23rd Annual ASDL External Advisory Board (EAB), 2015

Speed Mentoring

MULTIPLE CONFERENCES & EVENTS

- AIAA SciTech Forum 2022
- 32nd Congress of the International Council of the Aeronautical Sciences (ICAS), 2021

Institute Contributions

Georgia Tech Diversity, Equity, and Inclusion Council Working Group   *March 2021 - June 2021*

MEMBER

Description: Helped develop a systemic approach to mitigating the short- and long-term impacts of COVID-19 on the well-being and career progression of faculty at Georgia Tech

Georgia Tech Police Department's Student Partnership award   *March 2020*

GEORGIA TECH POLICE DEPARTMENT

Description: Awarded to research faculty and students for their contributions to a safer campus by ASDL's Grand Challenge team.

Simio Student Competition *May 2016*

A<small>DVISOR TO</small> F<small>IRST</small> P<small>LACE</small> T<small>EAM</small>

Simio Student Competition *May 2015*

A<small>DVISOR TO</small> F<small>IRST</small> P<small>LACE</small> T<small>EAM</small>

Mentor Jacket Program *2014*

M<small>ENTOR</small>