AIAA Dayton-Cincinnati Section

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS
DAYTON-CINCINNATI SECTION

SYMPOSIUM GUIDE

The Forty-Ninth Annual

Dayton-Cincinnati Aerospace Sciences Symposium

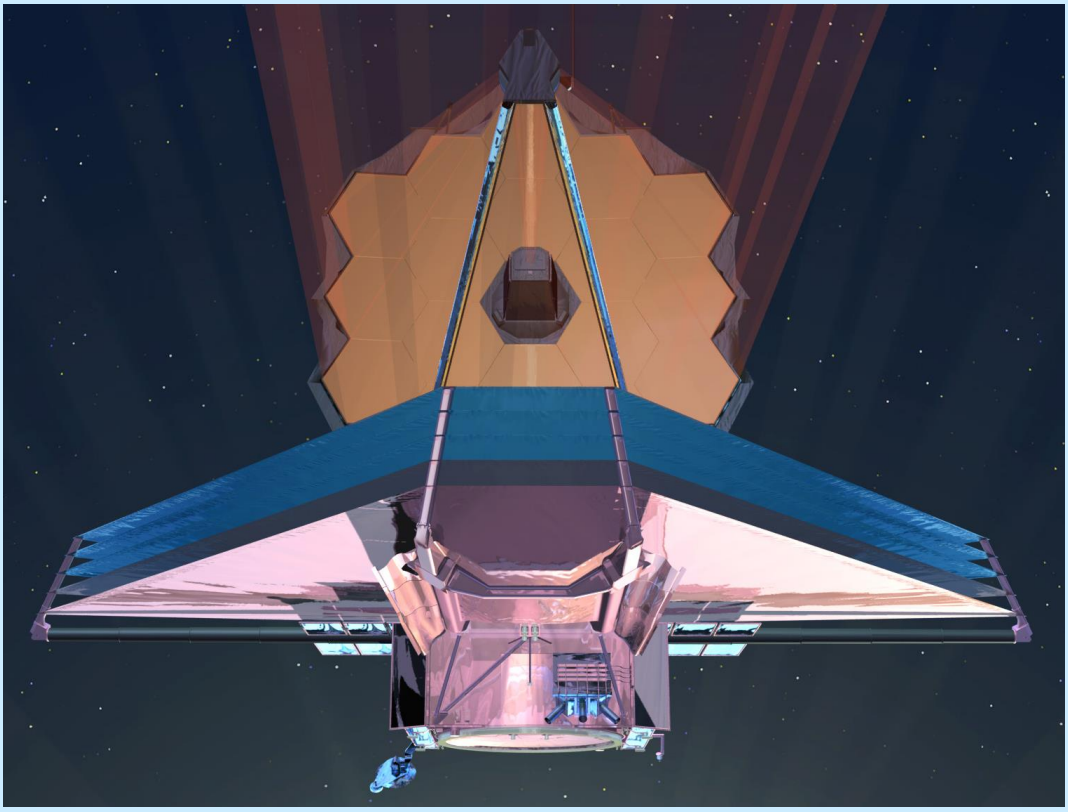

Photo Courtesy of Mr. Michael T. Menzel

Keynote Program: The Science and Engineering of the James Webb Space Telescope

5 March 2024

Sinclair Ponitz Conference Center

https://www.aiaa-daycin.org/DCASS

AIAA Student Sections: Air Force Institute of Technology, Case Western University, Cedarville University, Cleveland State University, Indiana University - Purdue University Indianapolis, Miami University, Ohio Northern University, Ohio State University, Ohio University, Purdue University, Rose-Hulman Institute of Technology, Trine University, University of Akron, University of Cincinnati, University of Dayton, University of Kentucky - Lexington, University of Kentucky - Paducah, University of Notre Dame, Wright State University,

Welcome

to the

49th AIAA Dayton-Cincinnati Aerospace Sciences Symposium (DCASS)

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The AIAA Dayton-Cincinnati Aerospace Sciences Symposium is just shy of its Golden Jubilee celebration! DCASS has provided a unique avenue for bringing together our regional aerospace community. The symposium showcases cutting-edge scientific and engineering research and innovations in the one-day event through technical presentations across multiple aspects of aerospace science and technology from modeling and design to manufacturing aspects.

About a record 200 technical presentations are delivered in a day-long symposium program. This year DCASS is celebrating the success of the James Webb Space Telescope (JWST) with an architect of the engineering marvel of JWST Mr. Michael Menzel, the Lead Systems Engineer of JWST. We are fortunate to have Mr. Manzel as our invited keynote speaker. His talk on "The Science and Engineering of the JWST" will discuss the challenges in design and operation of JWST, and outline how the two years of operations has reshaped our understanding of the space from our solar system to the early universe. Mr. Menzel has 42 years of experience in aeronautics and astronautics including 23 years in commercial and defense industry and 19 years at NASA. He began working on the Pre-Phase studies for the Next Generation Space Telescope in 1998, and in June of 2004 he took his current position as the NASA Mission Systems Engineer for the James Webb Space Telescope.

As a continuance of promoting Science, Technology, Engineering, and Mathematics (STEM) culture in the region and prepare young engineering leaders for future aerospace, we are continuing with a session for the highly aspiring High School Students Invited Talk Section. Last year the session has attracted so much attention that the committee discussed at length on how to support such a session and create a robust platform at DCASS to inspire our future aerospace professional.

The symposium has been organized by a group of dedicated volunteers who work throughout the year to make this meeting a success. This meeting would not be possible without the dedicated efforts of the few individual passionate volunteers. On behalf of the Executive members, we thank the chapter and national AIAA leadership, and the communities supporting DCASS, and our co-sponsoring professional societies listed within this program. This meeting is also made possible by our corporate and educational sponsors shown on the back of this program. We thank them for their generous support.

Finally, we encourage all attendees to submit their vote for the art-in-science contest. The best presentations and art-in-science award winners will be recognized at the annual Dayton-Cincinnati Section Awards Program.

We hope you enjoy today's symposium, and we look forward to seeing you again next year!

Drs. Anil Patnaik and Jose Camberos

2024 DCASS Executive Co-Chairs

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

DAYTON-CINCINNATI SECTION

2024 DAYTON-CINCINNATI SECTION AWARDS

CALL FOR NOMINATIONS

Recognize the achievements of your colleagues. The local Awards Banquet is going to be held on May 15th at the University of Dayton. Nominations are sought for several local awards. These include:

Outstanding Technical Contribution - Science Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] to recognize a significant scientific achievement during the past year.

Outstanding Technical Contribution - Application Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] to recognize a significant development or application achievement during the past year.

Outstanding Management Contribution Award: Presented to a Dayton-Cincinnati AIAA Section member(s) [limit of 2 people] for outstanding management contributions made during the past year.

There is no specific format required. Simply complete the attached form and E-mail the information. Award selections will be made by an expert panel of judges. Submit nominations (by E-mail) by **12 April 2024** to:

Dr. Marc Polanka
E-mail: marc.polanka@afit.edu

NOMINATION FORM

(Nomination Package Must be Limited to 2 Pages)

CATEGORY:

Nominee:	**Nominator:**
Affiliation:	**Affiliation:**
Address:	**Address:**
Tel:	**Tel:**
E-mail:	**E-mail:**

Symposium Schedule At-A-Glance

Registration: 7:00 AM – 2:00 PM

Corporate Exhibits: 9:00 AM – 4:00 PM

Art in Science Competition: 9:00 AM–4:00 PM **VOTE ONLINE:** www.aiaa-daycin.org/DCASS/AIS.php

Please fill out the Survey: www.aiaa-daycin.org/DCASS/feedback.php

First Block 8:20 AM – 10:00 AM

1	Hypersonic Flight Dyanmics & Controls	Room 116
2	Materials 1	Room 120
3	Aircraft & UAS Design & Applications 1	Room 127
4	Digital Engineering 1	Room 131
5	Combustion	Room 133
6	Fluid Stability and Control	Room 150
7	Particle Imaging Velocimetry	Room 164
8	Computational Fluid Dynamics	Room 171
9	Computational Fluid Dynamics	Room 282

Second Block 10:20 AM – 11:20 AM

10	Hypersonic Thermal Management 1	Room 116
11	Materials 2	Room 120
12	Acoustic & Applied Aerodynamics	Room 127
13	Structures 1	Room 131
	Room Not Used	Room 133
14	Flight Dynamics & Controls	Room 150
15	Applied Computational Fluid Dynamics	Room 164
16	Orbital Mechanics	Room 171
17	Gas Turbine Heat Transfer	Room 282

Keynote Program in Frederick C. Smith Auditorium (Room 150) 11:40 AM – 12:40 PM

Lunch in Great Hall 12:40 PM – 1:40 PM

Third Block 1:40 PM – 3:00 PM

18	Hypersonic Thermal Management 2	Room 116
19	Aircraft & UAS Design & Applications 2	Room 120
20	Aircraft Fluid Dyanmics	Room 127
21	Digital Engineering 2	Room 131
22	Rotating Detonation and Combustion Instabilities	Room 133
23	Fluid Dynamics	Room 150
24	Imaging & Diagnostics	Room 164
25	Space Systems 1	Room 171
26	Propulsion	Room 282

Fourth Block 3:20 PM – 4:40 PM

27	Hypersonic Fluid Dyanmics	Room 116
28	High School Scholars	Room 120
29	Uncertainty Quantification	Room 127
30	Structures 2	Room 131
31	Data Analysis	Room 133
	Room Not Used	Room 150
32	Turbomachinery 2	Room 164
33	Space Systems 2	Room 171
34	Heat Transfer	Room 282

The abstracts for the talks presented today may be found on the following website:
https://www.aiaa-daycin.org/DCASS/list_abs.php .
The Executive Committee encourages the use of this website.

Awards Information: The Dayton-Cincinnati Section of the AIAA is proud to continue its long-standing tradition of recognizing the best work presented at this symposium, as judged by the Session Chairs. This year, awards will be made in the following technical categories:

Category	Sessions	Category	Sessions
Aerospace Enabling Technology	1, 3, 14, 19	Imaging & Diagnostics	7, 24
Aircraft & Aerodynamics	6, 12, 20	Materials & Structures	2, 11, 13, 30
Combustion	5, 22	Turbomachinery & Propulsion	9, 26, 32
Data Analysis & Digital Engineering	4, 21, 29, 31	Space	16, 25, 33
Fluid Dynamics	8, 15, 23, 27	High School	28
Heat Transfer	10, 17, 18, 34		

Session Chairs will provide scores based on the quality of the abstract, innovation and magnitude of effort, technical contribution, and presentation style. One winner will be selected for each technical category, and the presenters will be invited to the AIAA Annual Awards Banquet (free ticket!) to receive their awards!

For online access to the Program-at-a-glance, please visit: https://www.aiaa-daycin.org/DCASS/glance.php

Time	Room 116	Room 120	Room 127	Room 131	Room 133	Room 150	Room 164	Room 171	Room 282
	SESSION 1	SESSION 2	SESSION 3	SESSION 4	SESSION 5	SESSION 6	SESSION 7	SESSION 8	SESSION 9
	Hypersonic Flight Dynamics & Controls	**Materials 1**	**Aircraft & UAS Design & Applications 1**	**Digital Engineering 1**	**Combustion**	**Fluid Stability and Flow Control**	**Particle Imaging Velocimetry**	**Computational Fluid Dynamics**	**Turbomachinery 1**
	Chair: Michael Zollars	Chair: Abdullah Amin	Chair: Donghoon Kim	Chair: Rick Graves	Chair: Marc Polanka	Chair: Carl Tilmann	Chair: Ahilan Appar	Chair: Troy Hoeger	Chair: Christopher Ruscher
	AFIT	*UD*	*UC*	*AFRL*	*AFIT*	*AFRL*	*UKY*	*AFLCMC*	*SE*
8:20 AM				*49DCASS-029* Interpretable AI for Aerospace Applications *Bharadwaj Dogga - UC* *Anoop Sathyan, Kelly Cohen - UC*	*49DCASS-109* Performance of Glow Plug Ignition Systems for Gas Turbine Engines in Quiescent Atmospheric Conditions *Bryce Ullman - WSU* *Brent Rankin - AFRL* *Mitch Wolff - WSU*	*49DCASS-055* Boundary Layer Control with Spanwise-Swept Shallow-Inclined Fluidic Wall Injector *Chase Vansickle - UC* *Daniel Cuppoletti - UC*			
8:40 AM				*49DCASS-065* Autonomous Navigation of Simulated Unknown Environments using CNN-DNN Network Fusion *Liam Mckenna - UC* *Andrew Gerstenslager - UC* *Jomol Lewis - UC* *Poorva Patel - UC*	*49DCASS-066* Combustion Dynamics within Type-II Intermittent States in a Multi-Nozzle Lean Direct Injection Combustor *Yuvi Nanda - UC* *Aditya Saurabh -* *Lipika Kabiraj -* *Ephraim Gutmark - UC*	*49DCASS-054* Verification of Effectiveness of Laminar Separation Control Actuation Frequencies for Eppler 387 Airfoil *Vincent Sheeler - WSU* *Mitch Wolff - WSU* *Christopher R. Marks - AFRL*	*49DCASS-125* Convergence of PIV for Electric Rotor Applications *Peter Sorensen - UC* *Daniel R. Cuppoletti - UC*	*49DCASS-001* A Multi-fidelity Gradient-based Constrained Optimization Method Applied to Benchmark Problems *Markus Rumpfkeil - UD* *Phil Beran - AFRL*	
9:00 AM	*49DCASS-078* Max Range Optimization in Pseudo 5DOF for Lifting Bodies with Heating and Survivability Constraints *Emma Webb - AFIT* *Robert A. Bettinger - AFIT*	*49DCASS-114* Mechanical Properties of Low Dimensional Materials *Arun Nair - AFIT*	*49DCASS-005* Wake Structure of the Prandtl-D *Patrick Hammer - AFRL* *Daniel J. Garmann - AFRL*	*49DCASS-074* Human Aware Navigation for Mobile Robots in Airport Environments: A Framework Integrating Enhanced Potential Field and Fuzzy Inference System *Shurendher Kumar Sampathkumar - UC* *Daegyun Choi - UC* *Donghoon Kim - UC*	*49DCASS-077* Investigating the Use of Low-Voltage Nanosecond-Pulsed Discharges for Cavity Ignition in Supersonic Flow *Katherine Opacich - UD* *Joshua S. Heyne -* *Erik L. Braun - NRC* *Timothy M. Ombrello - AFRL*	*49DCASS-123* Using Unsupervised Machine Learning to Reduce the Energy Requirements of Active Flow Control *Jared Kerestes - AFRL* *Christopher Marks - AFRL* *John Clark - AFRL* *Mitch Wolff - WSU*	*49DCASS-062* Dependency of PIV results on acquisition frequency in turbulent flows *Keerthan Ganeshan - UC* *Daniel R. Cuppoletti - UC*	*49DCASS-072* Automatic Geometry Generation, Meshing, and Aerodynamic Modeling *Christopher Humphrey - UC* *Jose Camberos - AFIT*	*49DCASS-027* Design and Evaluation of a Centrifugal Compressor for High Stage-Inlet Temperatures *Caleb Degler - AFIT* *James Rutledge and Frederick Schauer - AFIT*
9:20 AM	*49DCASS-079* Towards a Process for Characterizing Control and Stability Properties of Hypersonic Vehicles for Conceptual Design *Jose Camberos - AFIT* *Trevor D. Smiley - AFIT*	*49DCASS-026* Characterization of Axial-Torsion Yield Surfaces of Additively Manufactured Ti-6-4 at Varied Layer Heights *Joseph Puglisi - AFIT* *John Brewer - AFIT* *Ryan Kemnitz - AFIT* *Elizabeth Bartlett - AFRL*	*49DCASS-093* MDAO for Airframe-Propulsion-PTMS-Integration – Engine Design Case Study *Joshua Lupi - AFRL* *Timothy E. Wontor - UDRI* *Joshua D. Deaton - AFRL* *Nathan A. Wukie - AFRL*	*49DCASS-076* Application of Reinforcement Learning in High-Degree-of-Freedom Robotic Arms in Space *Kuan Wen - UC* *Anirudh Chhabra - UC* *Donghoon Kim - UC*	*49DCASS-084* Simulations of Mixing Interactions between Fuel Injection and Cavity Flameholding in Supersonic Crossflow *Benjamin Millard - UC* *Daniel Cuppoletti - UC*	*49DCASS-071* Application of Linear Stability Analysis to Compute Global Stability Modes of Canonical Fluid Flows *Mayur Mahale - UC* *Ephraim Gutmark - UC*	*49DCASS-016* Temporally Separated Same-color Dual-plane Stereo-PIV technique Using a Two-legged Burst-Mode Laser *Zifeng Yang - WSU* *Sirui Wang, Jianyi Zheng, Lei Li, Xunchen Liu, Yi Gao, Fei Qi -*	*49DCASS-089* Simulating Fluid Flows Using Quantum Computing *Marek Brodke - UC* *Prashant Khare - UC*	*49DCASS-018* Testing High Work, High Lift Low Pressure Turbine Airfoils in a Transonic Cascade *Ryan Sauder - WSU* *John Clark - AFRL* *Andy Lethander - AFRL* *Mitch Wolff - WSU*
9:40 AM	*49DCASS-057* Reconstructing and Reassessing Neil Armstrong's "First Man" Flight in the North American X-15 *Will Lorenzo - AC* *Timothy Takahashi - AFIT*	*49DCASS-110* A Novel and Straightforward Approach for Determining the Post-Necking True Stress-Strain Response of Aerospace Metals *Yatik Shah - UD* *Robert L. Lowe - UD*	*49DCASS-127* MDAO for Airframe-Propulsion-PTMS-Integration – Air Vehicle Design Case Study *Timothy Wontor - UDRI* *Joshua M. Lupi - AFRL* *Joshua D. Deaton - AFRL* *Nathan A. Wukie - AFRL*	*49DCASS-094* Modeling and Simulating Robotic Arm Capture of Satellites in Space using MATLAB Robotics System Toolbox *Sathya Karthikeyan - UC* *Anirudh Chhabra, Donghoon Kim - UC*	*49DCASS-095* CFD Analysis of Separate Flow Mixing of a Flow-Through Rotating Detonation Engine *Bret Lane - UC* *Ephraim J. Gutmark - UC*		*49DCASS-023* A Generalized Approach to Synthetic PIV images *Dilip Kalagotla - UC* *Paul Orkwis - UC*	*49DCASS-009* Turbulence Anisotropy and Mean Flow Correlations in the Periodic Hills Case *James Wnek - WSU* *Mitch Wolff - WSU* *Christopher Schrock - AFRL*	*49DCASS-085* Adjoint Optimization of Non-axisymmetric endwall Contours to Reduce Losses in a High-Pressure Turbine *Austin Hendrickson - OSU* *Spencer Sperling, Bao Nguyen, Richard Celestina, Jong Liu - HA* *Hakan Aksoy, Jeremy Nickol - HA* *Randall Mathison - OSU*
10:00 AM	Break								

Abbreviations:

AC = AFIT Contractor
AFA = Air Force Academy
AFIT = Air Force Institute of Technology
AFRL = Air Force Research Laboratory
ARO = Army Research Office
CFD = CFD Research Corporation
FGHS = Farragut High School
FLLC = Folderol, LLC
HA = Honeywell Aerospace
ISU = Iowa State University
KR = Kalindha Rashmi, LLC
MVH = Miami Valley Hospital
NRC = National Research Council
OAI = Ohio Aerospace Institute
OSU = The Ohio State University
OU = Ohio University
RMC = Royal Military College of Canada
RT = Radiance Technologies
SA = St. Andrews College
SE = Spectral Energies LLC
UC = University of Cincinnati
UD = University of Dayton
UDRI = University of Dayton Research Institute
UKY = University of Kentucky
UL = University of Louisville
WSU = Wright State University

AIAA Dayton-Cincinnati Section

49th Dayton-Cincinnati Aerospace Sciences Symposium

	Room 116	Room 120	Room 127	Room 131	Room 133	Room 150	Room 164	Room 171	Room 282
	SESSION 10	SESSION 11	SESSION 12	SESSION 13		SESSION 14	SESSION 15	SESSION 16	SESSION 17
	Hypersonic Thermal Management 1	**Materials 2**	**Acoustics & Applied Aerodynamics**	**Structures 1**		**Flight Dynamics & Controls**	**Applied Computational Fluid Dynamics**	**Orbital Mechanics**	**Gas Turbine Heat Transfer**
	Chair: Will Lorenzo	Chair: John Brewer	Chair: Christopher Ruscher	Chair: Arun Nair		Chair: Zifeng Yang	Chair: Markus Rumpfkeil	Chair: Anil Patnaik	Chair: Rolf Sondergaard
Time	*AC*	*AFIT*	*SE*	*AFIT*		*WSU*	*UD*	*AFIT*	*AFRL*
10:20 AM	*49DCASS-100* Characterizing Coupled Radiative and Conductive Heat Transfer in Atmospheric Re-Entry Vehicles *Colby Gore - UKY* *Savio Poovathingal - UKY* *John Maddox - UKY*	*49DCASS-042* High-Fidelity Melt Pool Prediction with a Physics-Guided Heat Source for Accelerated Laser Powder Bed Additive Manufacturing Simulations *Abdullah Amin - UD* *Robert Lowe - UD* *Nishat Sultana - UC*	*49DCASS-051* Internal Fluidic Injection for the Control of Supersonic Rectangular Jet Noise *Kaurab Gautam - UC* *Aatresh Karnam - UC* *Arshad Mohammad - UC* *Mohammed Saleem - UC* *Ephraim Gutmark - UC*	*49DCASS-003* Taylor Test *Anthony Palazotto - AFIT* *Katie Bruggeman, Showmik Ahsan, Henry Young - WSU* *John Hansen - AFIT*		*49DCASS-015* Shock-Induced Trailing Edge Separation Effect on F-16 Limit-Cycle Oscillation *Donald Kunz - AFIT* *Eric D. Stubblefield - AFIT*	*49DCASS-037* An application of the Lattice-Boltzmann method for ice particle melting *Carlos Eduardo Americo - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-063* The Circular Restricted N-Body Problem (CRNBP) in the Jupiter-Europa System *Annika Gilliam - AFIT* *Robert Bettinger - AFIT*	*49DCASS-014* Influence of Environmental Barrier Coatings on the Overall Effectiveness of a Film Cooled Ceramic Matrix Composite Plate *Shane Lindsay - AFIT* *James Rutledge - AFIT*
10:40 AM	*49DCASS-087* Thermal Exergy-Based Analysis of the Generic Hypersonic Vehicle *Neal Novotny - UD* *Markus Rumpfkeil - UD* *Jose Camberos - AFIT* *David John Neiferd and Joshua Deaton - AFRL*	*49DCASS-021* Spectral measurements of wavelength dependent radiation properties of LI-2200. *Yejajul Hakim - UKY* *Savio J. Poovathingal - UKY* *Michael W. Renfro - UKY*	*49DCASS-097* Micro-Vortex Generator Exploration Using F414 Geometry *James Cramer - UC* *Ephraim Gutmark - UC*	*49DCASS-019* Output only modal analysis of a flexible manipulator *Viet-hung Vu - RMC*		*49DCASS-058* A Reassessment of the Controllable Flight Envelope of the Bell X-1A *Will Lorenzo - AC* *Timothy Takahashi - AFIT*	*49DCASS-039* Gas-kinetic Simulations of Turbulent flow over a Porous TPS Surface *Ahilan Appar - UKY* *Savio Poovathingal - UKY*	*49DCASS-067* Heuristic Search Method to Optimize Development of a Cislunar Space Situational Awareness Architecture *Jacob Dahlke - AFIT* *Robert Bettinger - AFIT*	*49DCASS-017* Scaling the Overall Effectiveness of a Film-Cooled Flat Plate Based on a Matched Coolant Reynolds Number *John Di Lella - AFIT* *James L. Rutledge - AFIT*
11:00 AM	*49DCASS-106* Implementing two-temperature model in a unified solver: accounting non-equilibirum effect *Seungyong Baeg - UKY* *Raghava S. C. Davuluri - UKY* *Alexandre Martin - UKY*	*49DCASS-048* Statistical variance in radiative properties of porous materials *Ayan Banerjee - UKY* *Luis Chacon, Yejajul Hakim, Ahmed H. Yassin - UKY* *Michael Renfro, Savio J. Poovathingal - UKY*	*49DCASS-104* Experimental Investigation of a Skin-Actuated-Camber Morphing Wing Design *Julian Pabon - UD* *Xinyu Gao - UD* *Jielong Cai - UD* *Sidaard Gunasekaran - UD*	*49DCASS-011* Structural Index Parameter for Capturing Aerothermal Effects in Conceptual Level Vehicle Design *Samuel Atchison - AC* *Jose Camberos - AFIT*		*49DCASS-090* Legacy Interceptors with Classic Guidance Laws Emulating Modern Guidance Laws *Melody N. Mayle - UC* *Rajnikant Sharma - UC*	*49DCASS-118* The Effect of Temperature and Pressure on Radar Cross-Section of High-Speed Vehicles *Nathan Bebinger - UC* *Prashant Khare - UC*	*49DCASS-086* Historical Retrospective: 3- and 6-Degree-of-Freedom Analysis of the Magellan Aerobraking Experiment at Venus *Erica Higginbotham - AFIT*	*49DCASS-024* Biot Number Error in Low Temperature Inconel Overall Effectiveness Experiments *Bailey Hopkins - AFIT* *James L. Rutledge - AFIT* *Jacob A. Hughes - AFIT* *Carol E. Bryant - AFA*
11:20 AM	Break								
11:40 AM	KEYNOTE PROGRAM (see next page for details)								
12:40 PM	Lunch Break								

Abbreviations:

AC = AFIT Contractor
AFA = Air Force Academy
AFIT = Air Force Institute of Technology
AFRL = Air Force Research Laboratory
ARO = Army Research Office
CFD = CFD Research Corporation
FGHS = Farragut High School
FLLC = Folderol, LLC
HA = Honeywell Aerospace
ISU = Iowa State University
KR = Kalindha Rashmi, LLC
MVH = Miami Valley Hospital
NRC = National Research Council
OAI = Ohio Aerospace Institute
OSU = The Ohio State University
OU = Ohio University
RMC = Royal Military College of Canada
RT = Radiance Technologies
SA = St. Andrews College
SE = Spectral Energies LLC
UC = University of Cincinnati
UD = University of Dayton
UDRI = University of Dayton Research Institute
UKY = University of Kentucky
UL = University of Louisville
WSU = Wright State University

49th AIAA Dayton-Cincinnati Aerospace Sciences Symposium

Please join us at 11:40 for the Keynote Program:

Welcome and Announcements:

DR. ANIL PATNAIK

2024 DCASS Executive Chair

Keynote Address:

The Science and Engineering of the James Webb Space Telescope

MR. MICHAEL T. MENZEL

Lead Mission Systems Engineer, James Webb Space Telescope

The James Webb Space Telescope (JWST), launched on December 25, 2021, is NASA's successor mission to the Hubble Space Telescope. JWST has been designed and developed to observe "first light" objects in the nascent universe, the evolution of galaxies over cosmic history, star birth within our own galaxy, planet formation and evolution both in our solar system and in solar systems around other stars and to make detailed observations of some of the recently discovered exoplanets. The JWST telescope has an aperture greater than 6 meters in diameter, and along with its compliment of science instruments must be cooled to cryogenic temperatures below 50K. It is operated at the Sun-Earth L2 point to keep thermal sources such as the Sun and Earth in the same general direction so that their radiation can be shielded by a "tennis court sized" sunshield, allowing the payload to attain these temperatures passively.

The observatory is now into its second year of operations, producing magnificent images and science data that is already reshaping our understanding of the early universe. This presentation will give an overview of JWST science, its system design and its challenges. The presentation will then discuss the science observations and data collected to date.

Mr. Menzel has 42 years of experience in the aerospace, working 23 years in industry for commercial and defense missions and for NASA for the past 19 years. He is currently the NASA Mission Systems Engineer for the James Webb Space Telescope.

Mr. Menzel received a B.S. in Physics from the Massachusetts Institute of Technology in 1981 and an M.S. in Physics from Columbia University in 1986. He began his career in 1981 with the RCA Astro Space Division in East Windsor, N.J. as an antenna engineer, designing flight antennas for commercial and defense communications and remote sensing satellites. In 1990 he took a position in the Systems Engineering Group of the General Electric Astro Space Division designing commercial, DOD and civil space systems. In 1995 he took a position as Director of Systems Engineering in the Orbital Sciences Corporation, and in 1997 he took a position as the Deputy Program Manager for the Hubble Space Telescope Servicing Group at Lockheed Martin.

Mr. Menzel began working on the Pre-Phase studies for the Next Generation Space Telescope in 1998, and in June of 2004 he took his current position as the NASA Mission Systems Engineer for the James Webb Space Telescope.

Time	Room 116	Room 120	Room 127	Room 131	Room 133	Room 150	Room 164	Room 171	Room 282
	SESSION 18 **Hypersonic Thermal Management 2** Chair: Jose Camberos *AFIT*	SESSION 19 **Aircraft & UAS Design & Applications 2** Chair: Viet-hung Vu *RMC*	SESSION 20 **Aircraft Fluid Dynamics** Chair: Marc Polanka *AFIT*	SESSION 21 **Digital Engineering 2** Chair: Kamal Fernando *KR*	SESSION 22 **Rotating Detonation and Combustion Instabilities** Chair: Chris Fugger *SE*	SESSION 23 **Fluid Dynamics** Chair: Rama Gorla *AFIT*	SESSION 24 **Imaging & Diagnostics** Chair: Paul Hsu *SE*	SESSION 25 **Space Systems 1** Chair: Carl Hartsfield *AFIT*	SESSION 26 **Propulsion** Chair: Donald Kunz *AFIT*
1:40 PM	*49DCASS-028* Development of a custom supervised learning network to determine the recession rate of ablative thermal protection systems materials. *Vijay Mohan Ramu - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-128* Developing RF Ranging-Based Multi-Rotor Test-Bed for Cooperative Localization *Jayanth Ammapalli - UC*	*49DCASS-040* A Fluid-Structure Interaction Method for Rarefied Flows *Ethan Huff - UKY* *Hailong Chen - UKY* *Savio Poovathingal - UKY*	*49DCASS-061* Digital Curation for Aerospace System Product Development *Rick Graves - AFRL* *Kaitlin Henderson - RT*	*49DCASS-059* Rotating Detonation Engine Research at AFRL *Robert Fievisohn - AFRL*	*49DCASS-002* Wall-Resolved Large-Eddy Simulation of Flow over a Parametric Set of Gaussian Bumps *Donald Rizzetta - AFRL* *Daniel Garmann - AFRL*	*49DCASS-068* Exploring the Validity of Inverse Filtering for Flow Rate Estimation: A Comparative Analysis of Direct and Indirect Measurements in a Vibrating Nozzle *Jacob Michaud-dorko - UC* *Charles Farbos de Luzan - UC* *Ephraim Gutmark - UC* *Liran Oren - UC*	*49DCASS-031* Simulating Martian Environments for Testing of Localization Algorithms *Steven Kraine - UC* *Anirudh Chhabra - UC* *Donghoon Kim - UC*	*49DCASS-004* Positively Staggered Vertically Offset Propellers in Tandem *Jielong Cai - UD* *Sidaard Gunasekaran - UD* *Michael OL - FLLC*
2:00 PM	*49DCASS-032* Stochastic uncertainty quantification of structured carbon ablator (FiberForm) *Luis Chacon - UKY* *Ayan Banerjee - UKY* *Donghyun Kim - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-088* Optimal Trajectory Solutions for Unmanned Pursuer/Evader Offensive Counterair Including Engagement Zone *Alexander Hansen - AFIT* *Michael Zollars - AFIT* *Isaac Weintraub - AFRL* *Alexander Von Moll - AFRL*	*49DCASS-083* Thermochemical non-equilibrium hypersonic flow over a rectangular cavity embedded on a compression ramp *Jeremy Redding - UC* *Jacob Gamertsfelder - UC* *Luis Bravo - ARO* *Prashant Khare - UC*	*49DCASS-096* Hybrid Camera-LiDAR Trilateration with YOLO Based Landmark Detection *Travis Moleski - OU* *Jay P. Wilhelm - OU*	*49DCASS-103* Experimental and Computational Analysis of Instability Suppression through Perforated Liners in Rotating Detonation Engines *Tyler Pritschau - UC* *Jorge Betancourt - UC* *Peter Glaubitz - UC* *Ephraim Gutmark - UC*	*49DCASS-113* Characterization of Nozzle Spray Geometry in Propeller Wake *Sidaard Gunasekaran - UD* *Brock Greenwood - UD* *Abdul Khan - UD*	*49DCASS-107* Quantitative Concentration and Density Measurements in Subsonic and Supersonic Helium Jets Using Rainbow Schlieren Deflectometry *Taber Wanstall - UD* *Henry Jacques - UD* *Carson Running - UD*	*49DCASS-030* Instrumentation Design for KRUPS Atmospheric Entry Capsules *Bruno Domingues Tacchi - UKY* *Matthew P. Ruffner, Kirsten Ford, Logan Craig, - UKY* *William Smith, Alexandre Martin, Savio J. Poovathingal - UKY*	*49DCASS-050* A Novel, Microwave-Sustained Air Plasma Propulsion (MSAPP) Concept for Supersonic/Hypersonic Flights *Jincheng Wang - ISU* *Hui Hu - ISU* *Naibo Jiang - SE* *Paul Hsu - SE* *Sukesh Roy - SE*
2:20 PM	*49DCASS-046* Effect of spectral absorptivity and emission from non-isothermal medium on the thermal response of ablative materials *Ahmed H. Yassin - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-099* Deep Reinforcement Learning based pursuit of a ground target in a grid with local, partial and erroneous information *Srikanth Elkoori Ghantala Karnam - UC* *Rajnikant Sharma - UC*	*49DCASS-105* Path Definitions for Nozzle Ducts with Curvature and Transition *Vincent Onoja - UC* *Keerthan Ganeshan - UC* *Daniel Cuppoletti - UC*	*49DCASS-119* Aerial Vehicle Detection Using Ground Based LiDAR *Jack Kirschler - OU* *Jay Wilhelm - OU*	*49DCASS-111* Comparison of Thermoacoustic Instability Behavior in an LDI combustor When Using Propane and Methane Fuel *Shyam Muralidharan - UC* *Yuvi Nanda - UC* *Ephraim Gutmark - UC*	*49DCASS-043* Developing a Benchmarked Pathway to Quantify Patient-Specific Boundary Conditions for Hemodynamic Modeling in Cerebral Aneurysms *Hang Yi - WSU* *Zifeng Yang - WSU* *Luke Bramlage - MVH* *Bryan Ludwig - MVH*	*49DCASS-116* Multispectral Infrared Imaging of a Scramjet *Nathan Childs - WSU* *Mitch Wolff - WSU* *Timothy Ombrello - AFRL*	*49DCASS-044* AFIT Shadow Imaging Research Overview *Douglas Ruyle - AFIT* *David Curtis - AFIT*	*49DCASS-098* Flight Test Validation of Tandem Propeller Performance with Vertical and Horizontal Offset *Michael Foster - UD* *Jessica DeMoor - UD* *Jielong Cai - UD* *Sidaard Gunasekaran - UD*
2:40 PM	*49DCASS-102* Air-carbon Ablation (ACA) model evaluation with X2 expansion tunnel carbon sample experiment *Ares Barrios-lobelle - UKY* *Savio J. Poovathingal - UKY* *Alexandre Martin - UKY*		*49DCASS-120* Expanding the Lower Operating Range of Hypersonic Inlets With the Use of Fluidic Injection *Ryan O'rorke - UC* *Daniel Cuppoletti - UC*	*49DCASS-124* System Identification and Next-Generation Reservoir Computing for a Micro Turbojet Engine *Colton Wright - OU* *Jay Wilhelm - OU* *Nicholas Biederman, Brian Gyovai, Daniel J. Gauthier -*	*49DCASS-122* PLIF Imaging of Combustion Instabilities in a TARS Combustor *Grace Fischer - UC* *Ephraim J. Gutmark - UC*	*49DCASS-121* Discrete Vortical Gust Encounter and Mitigation using Closed Loop Control *Andrew Porterfield - UD* *Andrew Killian - UD* *Sidaard Gunasekaran - UD* *Michael Mongin - AFRL*		*49DCASS-080* Online 6-DoF Spacecraft Control for Multi-Agent Inspection Operations *Mark Mercier - AFIT* *David Curtis - AFIT*	*49DCASS-117* On the Linear Superposition of Wing and Propeller Performance in a Wing Embedded Propeller System *Jielong Cai - UD* *Emma Schutter - UD* *Sidaard Gunasekaran - UD*
3:00 PM	Break								

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AIAA Dayton-Cincinnati Section

49th Dayton-Cincinnati Aerospace Sciences Symposium

Time	Room 116	Room 120	Room 127	Room 131	Room 133	Room 150	Room 164	Room 171	Room 282
	SESSION 27 **Hypersonic Fluid Dynamics** Chair: Donald Rizzetta *AFRL*	SESSION 28 **High School Scholars** Chair: Jose Camberos *AFIT*	SESSION 29 **Uncertainty Quantification** Chair: Robert Fievisohn *AFRL*	SESSION 30 **Structures 2** Chair: Anthony Palazotto *AFIT*	SESSION 31 **Data Analysis** Chair: Taber Wanstall *UD*		SESSION 32 **Turbomachinery 2** Chair: James Rutledge *AFIT*	SESSION 33 **Space Systems 2** Chair: David Curtis *AFIT*	SESSION 34 **Heat Transfer** Chair: Rydge Mulford *UD*
3:20 PM	*49DCASS-007* Simulations of Nose Curvature Effects on Hypersonic Boundary Layer Transition *Tim Leger - OAI* *Matthew Tufts - AFRL* *Nicholas Bisek - AFRL*	*49DCASS-013* Leveraging Generative AI and Human Factors Techniques for Building Image Datasets *Isaiah Christopherson - AFRL* *Kara Combs - AFRL* *Jose Camberos - AFIT*	*49DCASS-036* Parametric and uncertainty quantification study of a fluid-structure interaction model *Michael Belair - UKY* *Ethan Huff - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-008* Computational Modeling of Single Shear Bolted Joint Hybrid Composite Laminates with and without Film Adhesive *Cameron Mcmahan - AFIT* *John Brewer - AFIT* *Micheal Gran - AFRL*	*49DCASS-012* Architectural Optimization of Emulator Embedded Neural Networks for Aerospace Vehicle Design *James Schmitz - WSU* *Harok Bae - WSU*		*49DCASS-070* Preparation of Experimental Inlet Swirl Distortion on a High-Speed Compressor *Marcus Acton - WSU* *Mitch Wolff - WSU* *Michael List - AFRL*	*49DCASS-053* The Variation of Radiative Heat Loss as a Function of Position for an Isothermal Square Twist Origami Radiator *Rydge Mulford - UD* *Mohammed Farhan Aziz Najeeb - UD* *Jeremy Price - UD* *David Warburton - UD*	*49DCASS-082* Material Response Modelling with an Influence of an RTV Layer *Hilmi Berk Gur - UKY* *Rui Fu - UKY* *Alexandre Martin - UKY*
3:40 PM	*49DCASS-049* Investigation of Spallation in TPS Materials *Kate Rhoads - UKY* *Alexandre Martin - UKY* *Kristen Price - UKY*	*49DCASS-041* Deep Learning based Optical Flow Analysis *Daniel Zhang - FGHS* *Zifeng Yang - WSU*	*49DCASS-045* Uncertainty Quantification by Probabilistic Analysis of Fluid/Solid Interaction *Rama Gorla - AFIT*	*49DCASS-033* Observing and modeling differential ablation in C/C composites *Cameron Brewer - UKY* *Cameron Brewer - UKY* *Savio J. Poovathingal - UKY*	*49DCASS-025* Aerodynamic Database Generation for a Generic High-Speed Concept Using Polynomial Chaos Expansion *Evan Burke - UD* *Markus Rumpfkeil - UD*		*49DCASS-075* Fundamental Research in Low Pressure Turbine Aerodynamics at AFRL *Christopher Marks - AFRL* *Molly Donovan - AFRL* *Jared Kerestes - AFRL* *Nathan Fletcher - AFRL* *John Clark - AFRL*	*49DCASS-091* Origami Investigation of Space-Based Mirror System *David Garcia - AFIT* *Robert A. Bettinger - AFIT*	*49DCASS-081* Void Fraction to Quality Correlation Study Applying the Separated Flow Model to Pulsed Power Loads *Zach Carner - WSU* *Abdeel Roman - AFRL* *Mitch Wolff - WSU*
4:00 PM	*49DCASS-006* Draco Ventus Clean Air Hypersonic Conditions Test Tunnel *Joseph Herdy - CFD* *Garry Freeman - ARO* *Ben Kerstiens - ARO* *Jonathan Coleman - ARO* *Doug Engle -*	*49DCASS-010* Creation of Non-Newtonian Blood Analogue with Similar Shear-thinning Properties *Chungyiu Ma - SA* *Jared Chong - WSU* *Hang Yi - WSU* *Zifeng Yang - WSU*	*49DCASS-130* Uncertainty Quantificaiton of Hypersonic Aerodynamic Heating *Laura Holifield - AFRL* *Matthew Tufts - AFRL*	*49DCASS-073* A Skin-Stabilizing Constraint for Feature-Based Topology Optimization of a Wingbox *Hollis Smith - NRC* *Joshua Deaton - AFRL*	*49DCASS-034* Quantification of TPS material permeability *Donghyun Kim - UKY* *Luis Chacon - UKY* *Savio J. Poovathingal - UKY*		*49DCASS-129* The PATMI Technology: The Path to Rapid Decarbonization of the Energy Sector *Kamal Fernando - KR*	*49DCASS-112* Preliminary Structural Design and Analysis of a 27U CubeSat *Matthew Evans - AFIT* *Robert Bettinger - AFIT* *John Brewer - AFIT* *Carl Hartsfield - AFIT*	*49DCASS-101* An Investigation into the Effective Gaseous Thermal Conductivity of Fibrous Insulation Materials *James Senig - UKY* *John F. Maddox - UKY*
4:20 PM		*49DCASS-035* Investigation of Off-Axis Thrust and Center of Gravity Misalignment on the Dynamic Stability of Mid and High-Powered Rockets *Richard Lian - UL* *Helen Bai -*						*49DCASS-126* Intelligent Control for Robotic Spacecraft Simulator with Kinematic Redundancy *Anirudh Chhabra - UC* *Donghoon Kim - UC*	
4:40 PM		*49DCASS-131* TBA *Sophia Majors - AFRL*							
5:00 PM	Adjourn								

Abbreviations:

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ARO = Army Research Office
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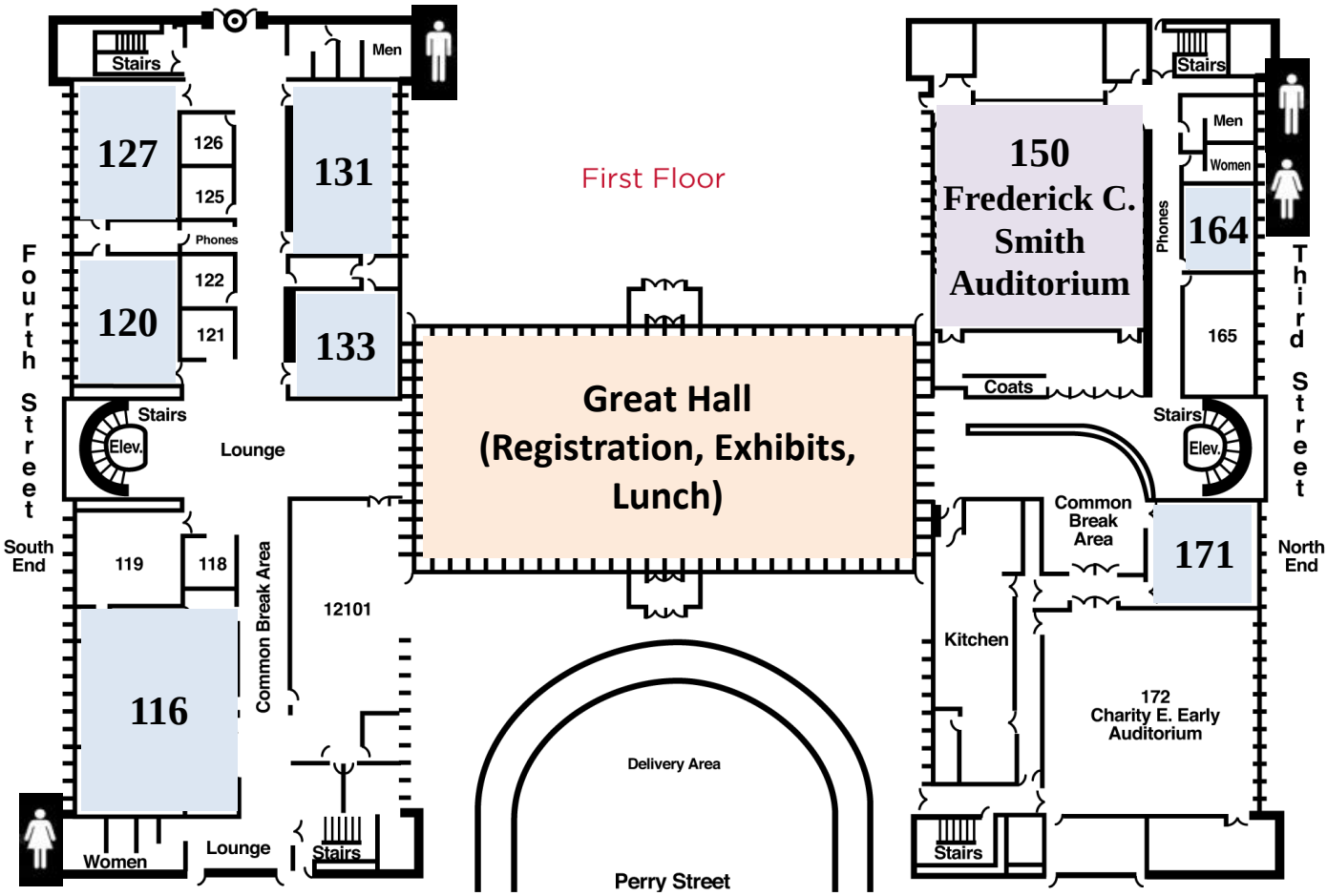

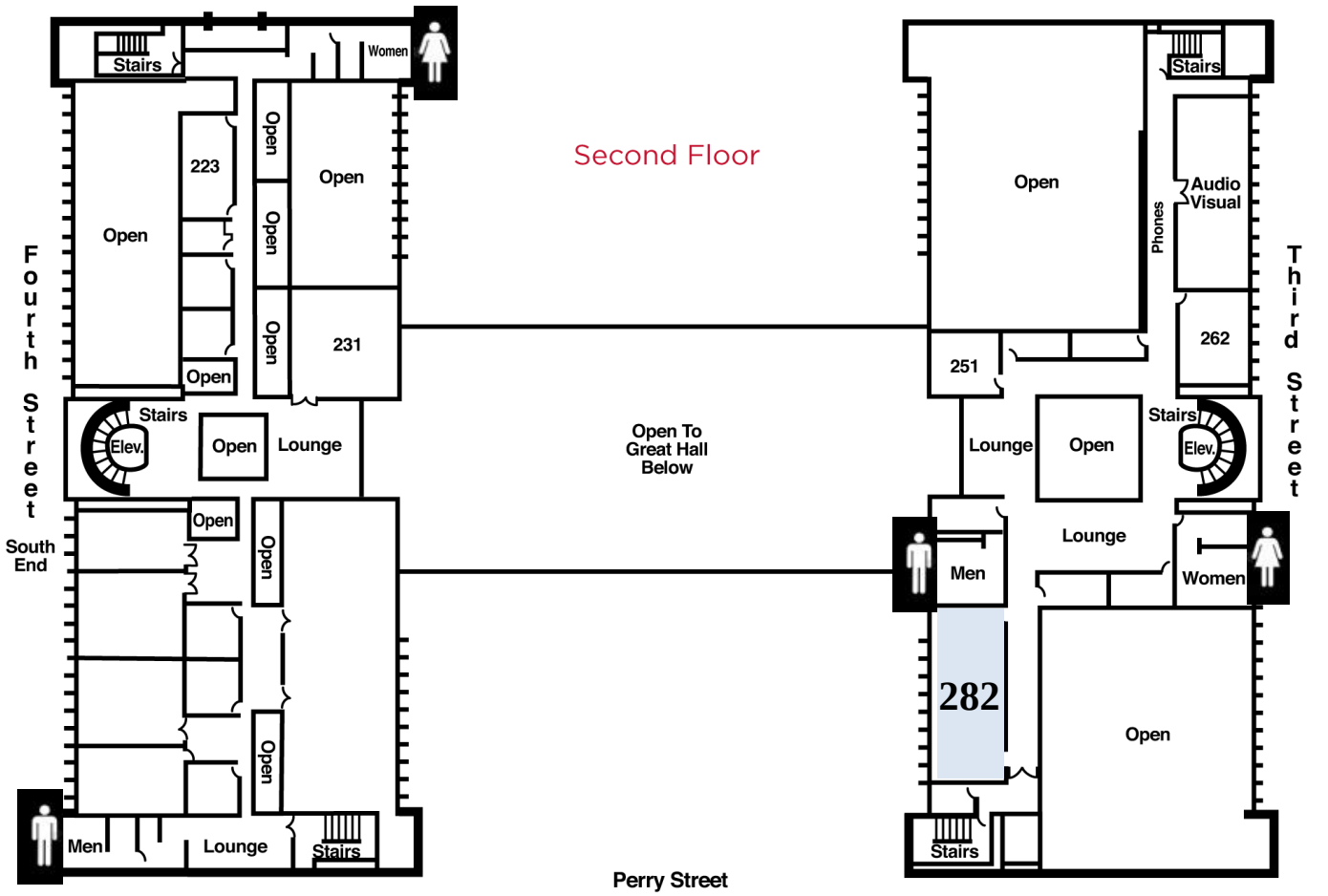

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