

This document outlines my proposal for attending the American Institute of Aeronautics and Astronautics (AIAA) SciTech conference from January 5-10, 2020, at the Hyatt Regency in Orlando, FL. AIAA's SciTech conference is the leading international conference in the aerospace field, with AIAA's technical committees each hosting presentation sessions throughout the conference focusing on various aspects of research and application. One of these technical committees is the Aerodynamic Measurement Techniques committee, which covers recent developments and research into aerodynamic sensors and sensing methods. My research at Notre Dame focuses on a sensor known as pressure-sensitive paint (PSP), and at the 2020 conference there will be two sessions and a workshop exclusively focused on developments of this sensing tool; my oral presentation will be in one of these sessions.

Pressure-sensitive paint is an opto-chemical sensor that works based on the principle of oxygen quenching [1-3]. It is used to measure a global pressure distribution over a wind tunnel model's surface with high spatial and temporal resolution. My presentation covers the development of a new PSP that is nearly insensitive to temperature. Currently, inherent temperature dependency of the paint is a major source of measurement error when using PSP [4]; since pressure-sensitive luminophores are also susceptible to thermal quenching, it can be difficult or impossible to determine if signal change in the sensor is due to changes in pressure or temperature. The sensor I have developed is based on pyrene sulfonic acid, which has been shown to be nearly temperature independent in a previous study [5]. My presentation focuses on the chemical development of an unsteady, sprayable paint as well as the characterization to determine relevant sensing parameters, which are of interest to the broader sensing community.

Attending this conference to present my research allows me to share my results with other professionals in the field, and also allows me to receive feedback on things I can improve and new application spaces for my sensor. This is especially important as a fifth-year graduate student as this will be a major part of my dissertation. Additionally, it will afford me the opportunity to attend presentations by and network with leading experts in the field including Christian Klein of Germany's DLR, Nettie Roozeboom from NASA Ames Research Center, Katya Casper from Sandia National Laboratories, and Hiroki Nagai of Tohoku University (I am a coauthor on his conference paper). Attending this conference will allow me to maintain these professional relationships and explore opportunities for future collaboration and employment after graduation.

I am also requesting \$350 in funding to attend a workshop to learn more about the challenges testing in high speed and high temperature environments as well as the future direction of hypersonic research. Through my work with the Air Force Research Laboratory, I have seen several applications where my sensor technology could improve the quality of the data being collected in a high-speed wind tunnel testing relevant to the hypersonic community, and this workshop would allow me to learn more about the pressing research questions in the field and available test facilities. The workshop would also give me the opportunity to network with leading researchers in the field, including Dan Marren from AEDC's White Oak facility and Matt Tufts from AFRL's Mach 6 Ludwieg tube.

I have already received \$850 through the GSPDA and am applying for internal department funds as well as the GSU Conference Presentation Grant (CPG). My estimated cost of conference attendance is \$1261, which is broken down in the attached budget, accounting for splitting an AirBnB with 3 other students from our lab and our adviser. This leaves \$411 as my current need from the CPG, which could ultimately be lower depending on the availability of department funds.

## References

- [1] T. Liu, J.P. Sullivan, *Pressure and Temperature Sensitive Paints*, Springer-Verlag, Berlin **2004**.
- [2] J.W. Gregory, H. Sakaue, T. Liu, J.P. Sullivan., Fast Pressure-Sensitive Paint for Flow and Acoustic Diagnostics, *Annual Review of Fluid Mechanics*, **2014**, 46, 303-330.
- [3] J.W. Gregory, K. Asai, M. Kameda, T. Liu, J.P. Sullivan, A Review of Pressure-Sensitive Paint for High-Speed and Unsteady Aerodynamics, *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering*, **2008**, Vol. 222, No. 2, 249-290
- [4] T. Liu, M. Guille, J.P. Sullivan, Accuracy of pressure-sensitive paint, *AIAA J.*, **2001**, 39, 103–12.
- [5] H. Sakaue, T. Kuriki, T. Miyazaki, A temperature-cancellation method of pressure-sensitive paint on porous anodic alumina using 1-Pyrenesulfonic acid, *Journal of Luminescence*, 2012, 132, 256-260.

Budget for travel to AIAA SciTech in Orlando, FL

Steven Claucherty

Supporting documentation attached on pages 2-4

Travel dates: January 4, 2020 – January 9, 2020

<b>Expense</b>	<b>Cost</b>	<b>Description</b>
Airfare	\$373	Round trip SBN to MCO
Conference registration	\$170	Student early rate
Hypersonic Development workshop	\$350	Early registration rate
AirBNB in Orlando	\$247	$(\$169/\text{night} * 5 \text{ nights} + \text{fees} = \$1234) / 5 = \$246.80$
Meals	\$121	$\text{Per diem} = (\$49.50 * 2 \text{ travel days} + \$66 * 4 \text{ full days}) * 0.33 = \$121$
Total	\$1261	

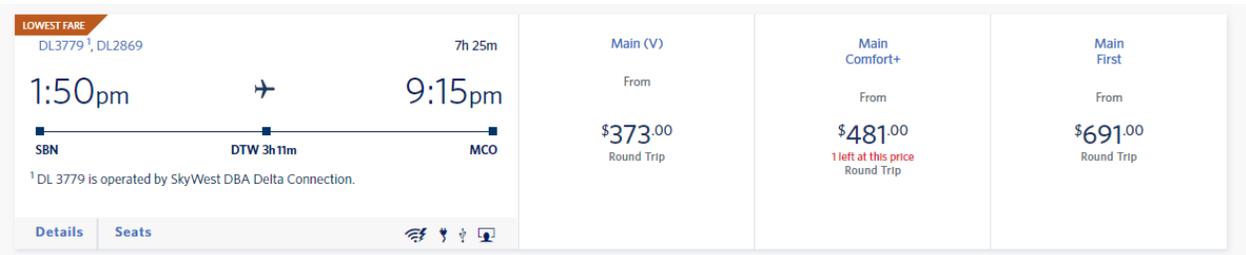


Figure 1. Airfare cost SBN to MCO round trip.

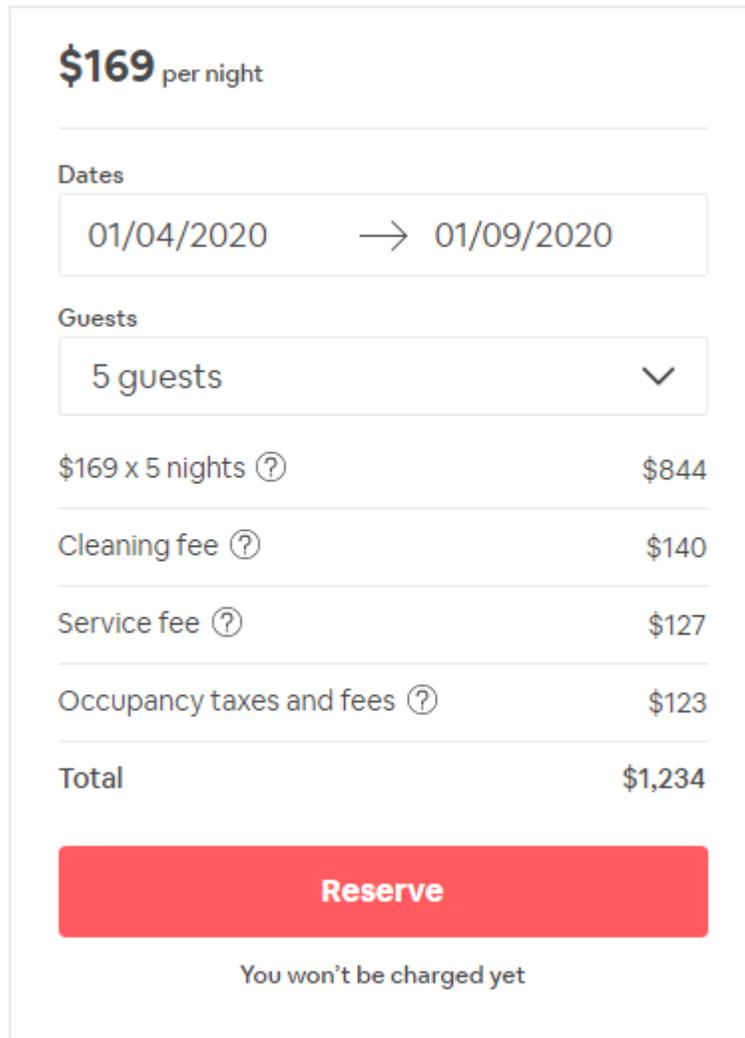


Figure 2. AirBNB cost in Orlando.

ABOUT US

Primary Destination	County	2019 Oct	Nov	Dec	2020 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Orlando	Orange	\$127	\$127	\$127	\$153	\$153	\$153	\$127	\$127	\$127	\$127	\$127	\$127

Showing 1 to 1 of 1 entries (filtered from 24 total entries)



### Meals & Incidentals (M&IE) Breakdown

Use this table to find the following information for federal employee travel:

**M&IE Total** - the full daily amount received for a single calendar day of travel when that day is neither the first nor last day of travel.

**Breakfast, lunch, dinner, incidentals** - Separate amounts for meals and incidentals. M&IE Total = Breakfast + Lunch + Dinner + Incidentals. Sometimes meal amounts must be deducted from trip voucher. [See More Information](#)

**First & last day of travel** - amount received on the first and last day of travel and equals 75% of total M&IE.

orl

Primary Destination	County	M&IE Total	Continental Breakfast/Breakfast	Lunch	Dinner	Incidental Expenses	First & Last Day of Travel
Orlando	Orange	\$66	\$16	\$17	\$28	\$5	\$49.50

Showing 1 to 1 of 1 entries (filtered from 24 total entries)

Figure 3. Per diem for Orlando.

Full conference	Conference Rate: \$230
<b>Full-Time Graduate or PhD Student</b>	Early Member Rate: \$170
Full-Time Undergraduate Student	Standard Member Rate: \$200
Full-Time Retired Member	Includes forum sessions Monday–Friday, access to the Exposition Hall, Sunday evening Welcome Mixer, and Tuesday's Welcome Happy Hour in the Exposition Hall.
One Day Rate	
Other Tickets (Add-On)	
<b>Courses and Workshops</b>	
3rd Sonic Boom Workshop	<b>75+ Years of Hypersonic Development: History, Resources, References, and Insights</b> <i>5 January 2020</i>
Additive Manufacturing Course	
Aeroelasticity Course	Conference Rate: \$450
Cubesat Engineering Course	Early Member Rate: \$350
Design of Experiments Course	Standard Member Rate: \$400
Digital Engineering Course	There is a rich history of over 75 years of Hypersonic development. This course is designed to touch on many of the key developments in the past and provide

Figure 4. Conference fee schedule.



Steven Claucherty &lt;sclauche@nd.edu&gt;

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**Submission Status: 2020 AIAA SciTech Forum (3246158)**

1 message

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**2020 AIAA SciTech Forum** <onbehalf@abstractcentral.com>

Fri, Aug 30, 2019 at 4:32 PM

Reply-To: AnnA@aiaa.org

To: sclauche@nd.edu, hsakaue@nd.edu

Friday, 30-Aug-2019

On behalf of the Forum Technical Program Committee, it is my pleasure to notify you that your unclassified submission:

Title: Dynamic Characterization and Application of Pyrene-based Polymer Ceramic Pressure-Sensitive Paint

Author(s): Steve Claucherty(1); Hirotaka Sakaue(1)

Author Affiliation(s): 1. University of Notre Dame, Notre Dame, IN, United States.

Control ID#: 3246158

Presentation Type: Technical Paper

Session: AMT-05, Pressure Sensitive Paint II, January 7, 2020 from 9:30 AM to 12:30 PM, (individual presentation time subject to change)

Presentation Duration: 30 minutes (reserve the last 5-10 minutes for questions and answers)

Manuscript Upload Access: Steve Claucherty only (presenting author, as designated in this submission)

Title/Author List Update Access: Steve Claucherty only (original submission/control ID submitter)

has been accepted for presentation at the 2020 AIAA SciTech Forum.

The detailed program is available on the Forum website, <http://aiaa-mst20.abstractcentral.com/itin.jsp>.

We invite you to present your work at the Forum, which will take place in Orlando, Florida, 6-10 January 2020. The Forum name and control ID number are provided for your reference and should be included on all correspondence. Do not include this information on your final manuscript.

No Paper, No Podium; No Podium No Paper Policies: This Forum has "No Paper, No Podium; No Podium, No Paper" policies which means that authors of unsubmitted papers will not be permitted to present at the Forum, and submitted papers that have not been presented will be withdrawn. Presenters must be physically in the session room while presenting their papers. These policies are intended to eliminate no-shows, to improve the quality of the conference for all participants, and to ensure that the published proceedings accurately represent the presentations made at a conference.

Final Manuscript Submission (not applicable to oral-only presentations): Final manuscripts will be submitted electronically to AIAA not later than 2000hrs/8pm Eastern Time 2 Dec. The manuscript deadline is a hard deadline so please plan accordingly. The presenting author, Steve Claucherty, will receive an email on or about 14 Oct with manuscript submission instructions. The substance of your final paper must conform to this accepted submission. Requests for any modifications are discouraged, but if needed must be made to your technical discipline chair prior to the manuscript deadline. After manuscripts are available online, in the proceedings, they cannot be replaced with a revised file. Updates can be noted, but the original file cannot be replaced so please allow adequate time to thoroughly proof your manuscript before the manuscript deadline, 2000hrs/8pm Eastern Time 2 Dec. For detailed information, please go to <https://arc.aiaa.org/page/crossmark>.

Title/Author List/Presenter Bio Updates (optional): The person who made this submission, Steve Claucherty, has access to update the title, author list and the presenter biography. This "Open Edit" period begins now and ends with the manuscript deadline, 2000hrs/8pm Eastern Time 2 Dec. To make edits, the submitter,

Steve Claucherty, must return to the ScholarOne submission site by going to <https://www.aiaa.org/SciTech> > Manage Submissions > Submission and follow the posted instructions. Please note that the title and author list as they appear in the ScholarOne submission module is what will be displayed in the printed program and the proceedings.

Review Feedback: Reviewer comments are provided by Forum Technical Discipline Chairs at their discretion. Go to <https://www.aiaa.org/SciTech/presentations-papers/call-for-papers> to determine whom to contact. Your submission was reviewed in Aerodynamic Measurement Technology: Surface Measurements such as PSP, TSP, skin friction, and Shear Stress Sensing.

Registration Questions: All attendees are required to register for the Forum. Registration is/will be available on the Forum website, <https://www.aiaa.org/SciTech> starting 10 Sep. Address all registration questions to [scitechaiaa@experient-inc.com](mailto:scitechaiaa@experient-inc.com).

Withdrawal: To withdraw your presentation, email [withdraw@aiaa.org](mailto:withdraw@aiaa.org) with the Forum name, the control ID number, and your assigned session. All withdrawals will be confirmed by email.

Author Resources: FAQs, and other resources, including a final manuscript template and a powerpoint template, are available at <https://www.aiaa.org/SciTech/presentations-papers/technical-presenter-resources>.

Visa for Travel: If you plan to attend this Forum and require a visa for travel, it is incumbent upon you to apply for your visa with the embassy or consulate of the country where the event is being held. Please allow ample processing time. To avoid bureaucratic problems, AIAA strongly suggests that you submit your formal application to the authorities of the country where the event is being held for a minimum of 120 days in advance of the date of anticipated travel. If you need an invitation letter, please go to <https://www.aiaa.org/SciTech/travel/visas>.

This Forum is organized by AIAA, the world's largest professional society devoted to the progress of engineering and science in aviation, space, and defense. AIAA's mission is to advance the arts, sciences, and technology of aeronautics and astronautics, and to promote the professionalism of those engaged in these pursuits.

This letter of invitation is not a commitment on the part of AIAA to provide financial support or to contact embassy officials on behalf of the Forum participant.

Again, congratulations on your accepted submission. We are pleased that you will be participating in this event as a speaker/attendee and look forward to working with you.

Ann Ames  
AIAA Technical Program Coordinator