

**Aimy Wissa. Ph.D.**

Assistant Professor, Mechanical and Aerospace Engineering  
Director of the Bioinspired Adaptive Morphology (BAM) lab



## ✈ CONTACT INFORMATION

Email: [awissa@princeton.edu](mailto:awissa@princeton.edu)

Research Website: <http://bamlab.princeton.edu>

Full list of Publications and Citations: <https://scholar.google.com/citations?hl=en&user=1SHzkWUAAAAJ>

Recent Invited Talk:

[https://www.dropbox.com/scl/fi/pc98ft9lc1kvqta83r115/Stanford-Robotics-Seminar\\_Wissa.mp4?rlkey=zz9qa9171bgkkictdd3c76qg4&st=wbxpnqfs&dl=0](https://www.dropbox.com/scl/fi/pc98ft9lc1kvqta83r115/Stanford-Robotics-Seminar_Wissa.mp4?rlkey=zz9qa9171bgkkictdd3c76qg4&st=wbxpnqfs&dl=0)

## ✈ RESEARCH EXPERTISE

My research group focuses on **Bioinspired Locomotion and Movement** to 1) improve mechanical system movements inspired by solutions and strategies in nature and 2) answer key biological questions about animal locomotion using experimental and analytical engineering tools. Current projects focus on the following areas: a) Bird-inspired flight, b) Insect-scale dynamics, and c) Multimodal and multimedial locomotion. We apply the fundamental knowledge gleaned from these projects to multi-scale robots and uncrewed aerial vehicles.

## ✈ ACADEMIC POSITIONS AND EDUCATION

<b>Princeton University, Princeton, NJ</b> Assistant Professor, Mechanical & Aerospace Engineering	2022-Present
<b>University of Illinois at Urbana-Champaign, Urbana, IL</b> Assistant Professor, Mechanical Science & Engineering	2015-2022
<b>Stanford University, Stanford, CA</b> Post-doctoral Scholar, Mechanical Engineering	2014-2015
<b>University of Maryland, College Park, MD</b> Ph.D., Aerospace Engineering	2010-2014
<b>University of Maryland, College Park, MD</b> M.S., Aerospace Engineering	2009-2010
<b>The Pennsylvania State University, State College, PA</b> Bachelor of Science, Aerospace Engineering	2004-2009

## ✈ HONORS AND AWARDS

### 1. NSF CAREER Award (2021)

This is NSF's most prestigious award in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

### 2. Air Force Office of Scientific Research Young Investigator Award (2018)

Through the YIP, the Department of the Air Force fosters creative basic research in science and engineering, enhances the early career development of outstanding young investigators, and increases opportunities for the young investigators to engage in forwarding the Department of the Air Force mission and related challenges in science and engineering.

### **3. Howard B. Wentz, Jr Junior Faculty Award (2024)**

The School of Engineering and Applied Science has honored Aimy Wissa with a junior faculty award for early-career excellence in research and teaching for her work on bio-inspired design for locomotion and adaptive structures.

### **4. Bioinspired Smart Materials and Systems Best Paper Award (2024)**

The award recognizes research in developing, characterizing, and applying bioinspired materials and systems. Papers must be peer-reviewed journal papers published in 2023. The award is presented by the ASME Bioinspired Materials and Structures Technical Committee.

### **5. Johnson and Johnson WiSTEM2D Scholars Finalist [37 finalists out of 500 applicants] (2023)**

Recognizes female researchers for their groundbreaking work in Science, Technology, Engineering, Math, Manufacturing and Design (STEM2D)

### **6. Selected as NAE Frontiers of Engineering 2022 Symposium Participant (2022)**

The Grainger Foundation Frontiers of Engineering symposium is a competitive selection program that brings together through 2-1/2 day meetings a select group of emerging engineering leaders from industry, academe, and government labs to discuss pioneering technical work and leading-edge research in various engineering fields and industry sectors., facilitating collaboration in engineering, the transfer of new techniques and approaches across fields, and establishment of contacts among the next generation of engineering leaders.

### **7. SPIE Smart Structures + NDE, Student Paper Award (First Place, 2019)**

Recognizes the best student paper at the SPIE Smart Structures + Nondestructive Evaluation Meeting, which consists of 9 conferences and 700 paper submissions.

### **8. Bioinspiration, Biomimetics, and Bioreplication Best Student Paper Awards (Second Place, 2019)**

Recognizes the best student presentation award from the Bioinspiration, Biomimetics, and Bioreplication conference within the SPIE Smart Structures + Nondestructive Evaluation Meeting

### **9. Air Force Research Lab Summer Faculty Fellowship (2016, 2018)**

The U.S. Department of the Air Force Summer Faculty Fellowship Program offers hands-on exposure to Department of the Air Force (DAF) research challenges through research residencies at participating DAF research facilities for full-time science, mathematics, and engineering faculty at U.S. colleges and universities. Fellows are selected based on a competitive application process.

### **10. ASME Adaptive Structures and Material Systems Best Structural Dynamics and Control Award (2018)**

This award recognizes the best-published paper on Adaptive Structures during the previous calendar year. The award is an ASME division-level award.

### **11. Biom'Innovate Challenge Award at the European Center for Excellence in Biomimicry (2nd Place, 2017)**

The Biom'Innovate challenge is a competition for bio-inspired projects, presented as part of the Biomim'expo, pitched LIVE in the final, and accompanied by a community of experts.

### **12. ASME Adaptive Structures and Material Systems Best Structural Dynamics and Control Award (2016)**

This award recognizes the best-published paper on Adaptive Structures during the previous calendar year. The award is an ASME division-level award. This was awarded for a publication based on my Ph.D. dissertation.

## 🦋 TECHNICAL PUBLICATIONS AND PRESENTATIONS

(P) peer-reviewed	(W) co-authored with students and postdocs, I supervise	(CL) Publication based on collaborative projects with me or my student as lead author
(*) invited publication	(S) based on my work as a student or a postdoc	(CO) Publication based on collaborative projects with me as Co-PI

### A. Peer-reviewed Journal Publications

(Publications 1 through 14 are published using my Princeton University Affiliation)

- <sup>(P, \*)</sup> Wissa, A. (2024). Bird-inspired leg enables robots to jump into flight. *Nature*, 636(8041), 48-49.
- <sup>(P, W)</sup> Othman, A., Sedky, G., & Wissa, A. (n.d.). Tunable covert-inspired flow control: an experimental and model-based investigation. Under Review
- <sup>(P, W)</sup> Sedky, G., Simon, N., Wiswell, H., Othman, A., & Wissa, A. (2024). Distributed feather-inspired flow control mitigates stall and expands flight envelope. *Proceedings of the National Academy of Sciences*. 121 (45) e2409268121.
- <sup>(P, W, \*, CL)</sup> Mathur, T., Viorney, L., Bolmin, O., Bergbreiter, S., & Wissa, A. (2024). Solution-driven bioinspired design: Themes of latch-mediated spring-actuated systems. *MRS Bulletin*, 49, 136-147.
- <sup>(P, W, CL)</sup> Othman, A., Nair, N., Goza, A., & Wissa, A. (2023). Feather-inspired flow control device across flight regimes. *Bioinspiration & Biomimetics*, 18(6), 066010.
- <sup>(P, W)</sup> Zekry, D., Nam, T., Gupta, R., Zhu, Y., & Wissa, A. (2023). Covert-inspired flaps: An experimental study to understand the interactions between upperwing and underwing covert feathers. *Bioinspiration & Biomimetics*, 18(4), 046021.
- <sup>(P, W, \*)</sup> Othman, A., Zekry, D. A., Saro-Cortes, V., Lee, K. J., & Wissa, A. (2023). Aerial and aquatic biological and bioinspired flow control strategies. *Communications Engineering*, 2(1), 30.
- <sup>(P, W, CO)</sup> Wang, Y., Wang, Q., Liu, M., Qin, Y., Cheng, L., Bolmin, O., Alleyne, M., Wissa, A., Baughman, R., Vella, D., & Tawfick, S. (2023). Insect-scale jumping robots enabled by a dynamic buckling cascade. *Proceedings of the National Academy of Sciences*, 120(5), e2210651120.
- <sup>(P, \*, CL)</sup> Wissa, A., Alleyne, M., Barley, W., & Suarez, A. (2022). Best practices of bioinspired design: Key themes and challenges. *Integrative and Comparative Biology*, 62(5), 1147-1152.
- <sup>(P, W, CL)</sup> Angatkina, O., Alleyne, A., & Wissa, A. (2022). Robust design and evaluation of a novel modular origami-enabled mobile robot (OSCAR). *Journal of Mechanisms and Robotics*, 15(2), 021015.
- <sup>(P, W, \*, CL)</sup> Saro-Cortes, V., Cui, Y., Dufficy, T., Boctor, A., Flammang, B., & Wissa, A. (2022). An adaptable flying fish robotic model for aero- and hydrodynamic experimentation. *Integrative and Comparative Biology*, 62(5), 1202-1216.
- <sup>(P, W, \*, CL)</sup> Bolmin, O., McElrath, T., Wissa, A., & Alleyne, M. (2022). Scaling of jumping performance in click beetles (Coleoptera: Elateridae). *Integrative and Comparative Biology*, 62(5), 1227-1234.
- <sup>(P, W, CO)</sup> Barley, W., Ruge-Jones, L., Wissa, A., Suarez, A., & Alleyne, M. (2022). Addressing diverse motivations to enable bioinspired design. *Integrative and Comparative Biology*. 62(5), 1192-1201.
- <sup>(P, \*)</sup> Wissa, A. (2022). Trade-offs between stability and maneuverability in bird flight. *Nature*, 603, 579-580.
- <sup>(P, W)</sup> Duan, C., & Wissa, A. (2021). Covert-inspired flaps for lift enhancement and stall mitigation. *Bioinspiration & Biomimetics*, 16, 046020.
- <sup>(P, W, CL)</sup> Bolmin, O., Socha, J. J., Alleyne, M., Dunn, A., Fezzaa, K., & Wissa, A. (2021). Nonlinear elasticity and damping govern ultrafast dynamics in click beetles. *Proceedings of the National Academy of Sciences*, 118(5), e2014569118.

17. <sup>(P, W)</sup> Gustafson, K., Angatkina, O., & Wissa, A. (2020). Model-based design of a multi-stable origami-enabled crawling robot. *Smart Materials and Structures*, 29, 015013.
18. <sup>(P, W)</sup> Ito, M., Duan, C., & Wissa, A. (2019). The function of the alula on engineered wings: A detailed experimental investigation of a bioinspired leading-edge device. *Bioinspiration & Biomimetics*, 14, 056015.
19. <sup>(P, W, CL)</sup> Bolmin, O., Wei, L., Hazel, A. M., Dunn, A. C., Alleyne, M., & Wissa, A. (2019). Latch and release: How the thoracic hinge morphology and mechanics enable the click of Elaterid beetles (Coleoptera: Elateridae). *Journal of Experimental Biology*, 222, jeb196683.
20. <sup>(P, W)</sup> Lynch, M., Mandadzhiev, B., & Wissa, A. (2018). Bioinspired wingtip devices: A pathway to improved aerodynamic performance during low Reynolds number flight. *Bioinspiration & Biomimetics*, 13, 036003.
21. <sup>(P, W, \*, CL)</sup> Mandadzhiev, M., Lynch, M., Chamorro, L., & Wissa, A. (2017). An experimental study of an airfoil with a bio-inspired leading-edge device at high angles of attack. *Smart Materials and Structures*, 26, 094008.
22. <sup>(P, W, \*, CO)</sup> Pagano, A., Yan, T., Chien, B., Wissa, A., & Tawfick, S. (2017). A crawling robot driven by multi-stable origami. *Smart Materials and Structures*, 26, 094007.
23. <sup>(P, S)</sup> Wissa, A., Calogero, J., Wereley, N., Hubbard, J. E., Jr., & Frecker, M. (2015). Analytical model and stability analysis of the leading-edge spar of a passively morphing ornithopter wing. *Bioinspiration & Biomimetics*, 10, 065003.
24. <sup>(P, S)</sup> Wissa, A., Grauer, J., Guerreiro, N., Tummala, Y., Altenbuchner, C., Hubbard, J. E., Jr., & Frecker, M. (2015). Free flight testing and performance evaluation of a passively morphing ornithopter. *International Journal of Micro Air Vehicles*, 7(1), 21-40.
25. <sup>(P, S)</sup> Tummala, Y., Wissa, A., Frecker, M., & Hubbard, J. E., Jr. (2014). Design and optimization of a contact aided compliant mechanism for passive bending. *Journal of Mechanisms and Robotics*, 6, 031013.
26. <sup>(P, S)</sup> Tummala, Y., Frecker, M., Wissa, A., & Hubbard, J. E., Jr. (2014). Design optimization of a twist compliant mechanism with nonlinear stiffness. *Smart Materials and Structures*, 23, 104011.
27. <sup>(P, S)</sup> Tummala, Y., Frecker, M., Wissa, A., & Hubbard, J. E., Jr. (2013). Design and optimization of a bend-and-sweep compliant mechanism. *Smart Materials and Structures*, 22, 094019.
28. <sup>(P, S, \*)</sup> Wissa, A., Tummala, Y., Hubbard, J. E., Jr., & Frecker, M. (2012). Passively morphing ornithopter wings using a novel compliant spine: Design and testing. *Smart Materials and Structures*, 21, 094028.

## B. Peer-reviewed Technical Conference Publications

(Publications 29 through 35 are published using my Princeton University Affiliation)

29. <sup>(P, W)</sup> Othman, A., & Wissa, A. (n.d.). Feather-inspired passive flaps for flow control on a finite rectangular wing. Accepted, *AIAA SciTech 2025 Forum*.
30. <sup>(P, W)</sup> Simon, N., Zekry, D., Sedky, G., & Wissa, A. (n.d.). Aerodynamic model synthesis of an aircraft with feather-inspired flow control devices. Accepted, *AIAA SciTech 2025 Forum*.
31. <sup>(P, W)</sup> Zekry, D., Nam, T., Zhu, Y., & Wissa, A. (n.d.). Identification of Aerodynamic Models for an Energy-Harvesting Kite using Multisine Inputs and Equation Error. Under review, *AIAA SciTech 2025 Forum*.
32. <sup>(P, W)</sup> Zekry, D., & Wissa, A. (2024). The physics of bio-inspired covert flaps as flight control devices. In *ASME 2024 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2024-13994*, Atlanta, GA.
33. <sup>(P, W, CL)</sup> Lee, K. J., Alleyne, M., & Wissa, A. (2023). A grasshopper-inspired glider: A study of gliding efficiency and wing morphology. In *2023 IEEE Conference on Control Technology and Applications (CCTA)*, Bridgetown, Barbados.

34. <sup>(P, W, CL)</sup> Saro-Cortes, V., Sedky, G., Ko, H., Flammang, B., & Wissa, A. (2023). Hydrodynamic evaluation of a flying fish robotic model organism: A study on the effects of the caudal fin shape. In *2023 IEEE Conference on Control Technology and Applications (CCTA)*, Bridgetown, Barbados.
35. <sup>(P, W, CL)</sup> Zhang, L., Mathur, T., Wissa, A., & Alleyne, M. (2023). Launching engineered prototypes to better understand the factors that influence click beetle jump capacity. In *2023 IEEE Conference on Control Technology and Applications (CCTA)*, Bridgetown, Barbados.
36. <sup>(P, W)</sup> Alvarez, A., & Wissa, A. (2021). Bird-inspired morphing wings: Design and experimental evaluation of a wing folding mechanism for pitch stability control. In *ASME 2021 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2021-68299*. Virtual.
37. <sup>(P, W)</sup> Othman, A., Nirmal, N., Sandeep, A., Goza, A., & Wissa, A. (2022). Numerical and experimental study of a covert-inspired passively deployable flap for aerodynamic lift enhancement. In *AIAA 2022-3980. AIAA AVIATION 2022 Forum*. June 2022.
38. <sup>(P, W)</sup> Zekry, D., Duan, C., Ito, M., & Wissa, A. (2021). Design of experiments for two- and three-dimensional bio-inspired flow control devices. In *AIAA 2021-0467. AIAA SciTech 2021 Forum*. January 2021.
39. <sup>(P, W, CL)</sup> Angatkina, O., Gustafson, K., Wissa, A., & Alleyne, A. (2019). Path Following for the Soft Origami Crawling Robot. In *Proc of the ASME 2019 Dynamic Systems and Control Conf.* 2019-9175, Park City, Utah
40. <sup>(P, W, CL)</sup> Ito, M., Chamorro, L., & Wissa, A. (2018). A leading-edge alula-inspired device (LEAD) for stall mitigation and lift enhancement for low Reynolds number finite wings. In *ASME 2018 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2018-8170*, San Antonio, TX.
41. <sup>(P, W)</sup> Duan, C., Waite, J., & Wissa, A. (2018). Design optimization of a covert feather-inspired deployable structure for increased lift. In *AIAA 2018-3174. 2018 Applied Aerodynamics Conference*. June 2018.
42. <sup>(P, W, CL)</sup> Angatkina, O., Chien, B., Pagano, A., Tawfick, S., Alleyne, A., & Wissa, A. (2017). A metameric crawling robot enabled by origami and smart materials. In *ASME 2017 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2017-3836*, Snow Bird, UT.
43. <sup>(P, W)</sup> Bolmin, O., Urrutia, U., Abdulla, A., Hazel, A., Alleyne, M., Dunn, A., & Wissa, A. (2017). Pop! Observing and modeling the legless self-righting jumping mechanism of click beetles. In *Biomimetic and Biohybrid Systems. Living Machines 2017. Lecture Notes in Computer Science, Vol 10384*. Springer, Cham.
44. <sup>(P, W, CO)</sup> Pagano, A., Leung, B., Chien, B., Yan, T., Wissa, A., & Tawfick, S. (2016). Multi-stable origami structure for crawling locomotion. In *ASME 2016 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2016-9071*, Stowe, VT.
45. <sup>(P, W)</sup> Mandadzhiev, B., Lynch, M., Chamorro, L., & Wissa, A. (2016). Alula-inspired leading edge device for low Reynolds number flight. In *ASME 2016 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2016-9210*, Stowe, VT.
46. <sup>(P, S)</sup> Wissa, A., Han, K., & Cutkosky, M. (2015). Wings of a feather stick together: Morphing wings with barbule-inspired latching. In *Proceedings of 4th International Conference on Biomimetic and Biohybrid Systems*, Barcelona, Spain.
47. <sup>(P, S)</sup> Hasnain, Z., Hubbard, JE, Jr., Calogero, J., Frecker, M., & Wissa, A. (2015). Understanding the Relationship Between Pitch Agility and Propulsive Aerodynamic Forces in Bio-Inspired Flapping Wing Vehicles. In *ASME 2015 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2015-8835*, Colorado Springs, CO.
48. <sup>(P, S)</sup> Wissa, A., Tummala, Y., Hubbard, J. E., Jr., Frecker, M., & Northrup, M. (2014). Inertial effects due to passive wing morphing in ornithopters. In *Proceedings of 22nd AIAA/ASME/AHS Adaptive Structures Conference, 2014-1123*, National Harbor, MD.

49. <sup>(P, S)</sup> Wissa, A, Calogero, J, Hubbard, JE, Jr., & Frecker, M. (2014). Stability Analysis of the Wing Leading Edge Spar of a Passively Morphing Ornithopter. In *ASME 2014 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2014-7528*, Newport, RI.
50. <sup>(P, S)</sup> Wissa, A., Guerreiro, N., Grauer, J., Hubbard, J. E., Jr., Altenbuchner, C., Tummala, Y., Frecker, M., & Roberts, R. (2013). Flight testing of novel compliant spines for passive wing morphing on ornithopters. In *Proc. 21st Adaptive Structures Conference, 2013-1516*, Boston, MA.
51. <sup>(P, S)</sup> Altenbuchner, C., Hubbard, J. E., & Wissa, A. (2013). Free flight validation of a flexible-multi-body structural dynamics model of a bioinspired ornithopter. In *51st AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition 2013*. Grapevine, TX.
52. <sup>(P, S)</sup> Tummala, Y, Wissa, A, Frecker, M, & Hubbard, JE, Jr. (2011). Design Optimization of a Compliant Spine for Dynamic Applications. In *ASME 2011 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2011-5207*, Scottsdale, AZ.
53. <sup>(P, S)</sup> Wissa, A., Tummala, Y., Hubbard, J. E., Jr., Frecker, M., & Brown, A. (2011). Testing of novel compliant spines for passive wing morphing. In *ASME 2011 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2011-5198*, Scottsdale, AZ.
54. <sup>(P, S)</sup> Tummala, Y., Wissa, A., Frecker, M., & Hubbard, J. E., Jr. (2010). Design of a passively morphing ornithopter wing using a novel compliant spine. In *ASME 2010 Proc. Smart Materials, Adaptive Structures, and Intelligent Systems Conf. 2010-3637*, Philadelphia, PA.

### C. Other Technical Conference Publications

55. <sup>(W)</sup> Lee, K., & Wissa, A. (2020). Dynamic characterization of a bio-inspired variable stiffness multi-winglet device. In *Proc. SPIE 11377, Behavior and Mechanics of Multifunctional Materials IX, 113770K*.
56. <sup>(W)</sup> Gustafson, K., Urrutia, L., Pankonien, A., Reich, G., & Wissa, A. (2019). Adaptive and compliant wingtip devices enabled by additive manufacturing and multi-stable structures. In *Proc. SPIE 10965, Bioinspiration, Biomimetics, and Bioreplication IX, 109650J*.

### D. Unpublished Technical Presentations

1. Zekry, D. & Wissa, A. (2024). Covert-Inspired Flaps as Flight Control Devices During Dynamic Pitching Maneuvers. *APS Division of Fluid Dynamics Meeting*.
2. Othman, A. & Wissa, A. (2024). Span-distributed Coverts-inspired Flow Control Devices. *APS Division of Fluid Dynamics Meeting*.
3. Zekry, D., Wiswell, H., & Wissa, A. (2024). *NAWEA / WindTech 2024 Conference*.
4. Lee, K., & Wissa, A. (2024). Towards insect-scale multi-modal robots: The gliding aerodynamics and wing deployment kinematics of *Schistocerca americana* grasshoppers. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
5. Earnhardt, A., & Wissa, A. (2024). Effect of actuator stroke and dynamics on the bioinspired locomotion of a single and multi-robot system. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
6. Mathur, T., Zhang, L., Khan, S., Gibson, J., Alleyne, M., & Wissa, A. (2024). A click beetle inspired robotic model organism: Exploring the physics of line of action and spring design. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
7. Othman, A., Sedky, G., & Wissa, A. (2024). Coverts-inspired flow control devices: 2D vs 3D. *Direct in-Person Colloquium on Vortex Dominated Flows*.
8. Wiswell, H., Sedky, G., & Wissa, A. (2024). Hawk and roll: Aerodynamics of Harris's hawk-inspired wingtips in and out of ground effect. *Society of Integrative and Comparative Biology Annual Meeting*.

9. Sedky, G., & Wissa, A. (2024). A dance of feathers: The fluid dynamics of feather-inspired flow control devices. *Society of Integrative and Comparative Biology Annual Meeting*.
10. Saro-Cortes, V., Flammang, B., & Wissa, A. (2024). Forces of nature: Flying fish taxi and takeoff mechanics. *Society of Integrative and Comparative Biology Annual Meeting*.
11. Zhang, L., Mathur, T., Wissa, A., & Alleyne, M. (2024). Bugs and robots: Investigate the external reaction from clicking mechanics using dynamic simulation. *Society of Integrative and Comparative Biology Annual Meeting*.
12. Mathur, M., Zhang, L., Gibson, J., Bolmin, O., Socha, J., Alleyne, M., Wilmsen, S., Fezza, K., & Wissa, A. (2024). Go with the flow: Developing a scaffold to examine the energy flow within click beetles. *Society of Integrative and Comparative Biology Annual Meeting*.
13. Othman, A., Sedky, G., & Wissa, A. (2023). Feather-inspired flow control devices: 2D vs 3D comparison. *APS Division of Fluid Dynamics Meeting*.
14. Zekry, D., & Wissa, A. (2023). Covert-inspired flaps as flight control surfaces for BWB aircrafts. *APS Division of Fluid Dynamics Meeting*.
15. Wiswell, H., Sedky, G., & Wissa, A. (2023). Flow physics of bioinspired wingtips for drag reduction. *APS Division of Fluid Dynamics Meeting*.
16. Sedky, G., Othman, A., & Wissa, A. (2023). Flow physics of bioinspired passive multi-flap wings with variable stiffness. *APS Division of Fluid Dynamics Meeting*.
17. Saro-Cortes, V., Cui, Y., Yanez, J., Flammang, B., & Wissa, A. (2023). Experimental study of the effect of caudal fin stiffness on taxi locomotion of a robotic flying fish model. *APS Division of Fluid Dynamics Meeting*.
18. Sedky, G., Othman, A., & Wissa, A. (2023). Experimental study on covert-inspired flow control using time-resolved flowfield measurements. *Direct in-Person Colloquium on Vortex Dominated Flows*.
19. Othman, A., Sedky, G., & Wissa, A. (2023). Feather-inspired high-lift flow control device for stall mitigation. *Direct in-Person Colloquium on Vortex Dominated Flows*.
20. Mathur, M., Zhang, L., Alleyne, M., Socha, J., Wilmsen, S., Fezza, K., Clark, S., & Wissa, A. (2023). Latching, loading, and release in click beetles under different mechanical constraints. *Society of Integrative and Comparative Biology Annual Meeting*.
21. Yañez-Salas, J., Saro-Cortes, V., Cui, Y., Flammang, B., & Wissa, A. (2023). A flying fish robotic model organism: Design, fabrication and experimental evaluation. *Society of Integrative and Comparative Biology Annual Meeting*.
22. Zhang, L., Mathur, T., Cui, Y., Wissa, A., & Alleyne, M. (2023). Launching engineered prototypes to study the factors that influence click-beetle jump capacity. *Society of Integrative and Comparative Biology Annual Meeting*.
23. Cui, Y., Yañez-Salas, J., Saro-Cortes, V., Flammang, B., & Wissa, A. (2023). A flying fish robotic model organism: Designing a biologically relevant caudal fin. *Society of Integrative and Comparative Biology Annual Meeting*.
24. Saro-Cortes, V., Yañez-Salas, J., Cui, Y., Flammang, B., & Wissa, A. (2023). A flying fish robotic model organism: Multibody dynamic modeling and experimental validation. *Society of Integrative and Comparative Biology Annual Meeting*.
25. Wang, Y., Wang, Q., Liu, M., Qin, Y., Cheng, L., Bolmin, O., Alleyne, M., Wissa, A., Baughman, R., Vella, D., & Tawfick, S. (2022). Rapid design cycles of insect scale jumping robot phenotypes. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.

26. Lee, K., Fauziyah, S., Alleyne, M., & Wissa, A. (2022). Free flight experiment and design of a deployable wing mechanism of an insect-inspired glider based on morphological and aerodynamic characterization of *Dissosteira carolina* grasshoppers. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
27. Saro-Cortes, V., & Wissa, A. (2022). Design, fabrication, and evaluation of a flying fish inspired robotic model organism. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
28. Zekry, D., & Wissa, A. (2022). Coverts as yaw and roll bioinspired control devices for tailless UAVs. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
29. Lee, K., Alleyne, M., & Wissa, A. (2022). An insect-inspired glider based on morphological and aerodynamic characterizations of grasshoppers. *Society of Integrative and Comparative Biology Annual Meeting*.
30. Saro-Cortes, V., Flammang, B., & Wissa, A. (2022). The role of the pelvic fin in flying fish: An experimental study on a bioinspired flying fish. *Society of Integrative and Comparative Biology Annual Meeting*.
31. Bolmin, O., Alleyne, M., & Wissa, A. (2021). Mobility power flow: How click beetles transmit and dissipate mechanical power. *Society of Integrative and Comparative Biology Annual Meeting*.
32. Zekry, D., Cheng, S., Chamorro, L., & Wissa, A. (2020). Towards mission adaptability of small UAVs: A leading-edge alula-inspired device (LEAD). *APS Division of Fluid Dynamics Meeting*.
33. Duan, C., & Wissa, A. (2020). Study of multiple covert-inspired lift-enhancing flaps. *APS Division of Fluid Dynamics Meeting*.
34. Bolmin, O., Alleyne, M., & Wissa, A. (2020). How does morphology affect jumping kinematics of click beetles? *Society of Integrative and Comparative Biology Annual Meeting*.
35. Wissa, A. A. (2020). Aerodynamic characterization of a leading-edge alula-inspired device. *Society of Integrative and Comparative Biology Annual Meeting*.
36. Bolmin, O., Wei, L., Socha, J., Alleyne, M., Dunn, A., & Wissa, A. (2019). JUMP: Experiment-enabled modeling of click beetle jumps for robotic applications. *APS March Meeting Abstracts*.
37. Wissa, A., Duan, C., & Ito, M. (2019). Avian-inspired devices for improved mission adaptability in unmanned aerial vehicles. *APS March Meeting Abstracts*.
38. Alleyne, M., & Wissa, A. (2019). Classroom robophysics: Methods for teaching bioinspired design. *APS March Meeting Abstracts*.
39. Bolmin, O., Wei, L., Hazel, A., Alleyne, M., Dunn, A., & Wissa, A. (2019). Latch and release: How hinge morphology and mechanics enable the explosive click of Coleoptera Elateridae. *Society of Integrative and Comparative Biology Annual Meeting*.
40. Bolmin, O., Socha, J. J., Alleyne, M., Dunn, A. C., & Wissa, A. A. (2019). The click beetle latch mechanism: An in-vivo study using synchrotron x-rays. *Society of Integrative and Comparative Biology Annual Meeting*.
41. Alleyne, M., & Wissa, A. (2019). Handy design tools to help you survive the antlion pit competition. *Entomology*.
42. Duan, C., & Wissa, A. (2019). Design optimization of a nonlinear hinge for an adaptive feather-inspired flap. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
43. Ito, M., & Wissa, A. (2019). Towards mission adaptability of small UAVs: A deployment mechanism for an adaptive leading-edge alula inspired device. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
44. Angatkina, O., Singh, S., Wissa, A., & Alleyne, A. (2019). Autonomous path following for a soft compliant origami crawling robot. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.
45. Bolmin, O., Alleyne, A., & Wissa, A. (2019). Kinematics and dynamics of the energy release stage of click beetles: Power amplified mechanism. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.



46. Bolmin, O., Hazel, A. M., Urrutia, L., Garrett, A. P., Malik, I. G., Abdulla, A. M., Duan, C., Chapa, R. M., Dunn, A. C., & Wissa, A. (2017). Studying the click-beetle self-righting jump mechanics and dynamics as a design guide for a bio-inspired innovative robot. *Entomology*
47. Lynch, M., Mandadzhiev, B., & Wissa, A. (2016). Aerodynamic effects of bio-inspired nonplanar wingtip geometries at low Reynolds number. *ASME Smart Material, Adaptive Structures, and Intelligent Systems*.

## E. Invited Talks

### 2024

1. BioInspired Sensing Computing and Control with International Teams Workshop (Keynote Speaker)
2. Princeton University, Princeton Materials Institute Symposium (Invited Speaker)
3. California Institute of Technology, Mechanical and Civil Engineering Seminar
4. Johns Hopkins University, Center for Environmental and Applied Fluid Mechanics Seminar
5. University of Michigan, Mechanical Engineering Seminar

### 2023

6. Stanford University, Robotics Seminar
7. Purdue University, ICON Seminar
8. AI for Good Global Forum (<https://tinyurl.com/4dysxksr>)
9. NJ Governor's STEM Scholars
10. Princeton Catalysis Initiative Symposium
11. Bioinspired Aerial and Aquatic Locomotion Workshop

### 2022

12. The Army DEVCOM Soldier Center Seminar
13. Yale University, Mechanical, and Material Science Seminar
14. UC Irvine, Ecological and Evolutionary Biology Seminar
15. Fast Movements: Nature, Robotics and Materials Symposium (Keynote Speaker)
16. ICRA Workshop: Energy Storage and Delivery in Robotic Systems (Invited Speaker)
17. Princeton University, Robotics Seminar
18. Society of Integrative and Comparative Biology Annual Meeting (Invited Symposium Speaker)

### 2021

19. Nottingham University Institute for Aerospace Technology Course Seminar
20. Stanford University, Future of Mechanical Engineering Seminar
21. Brown University, SEAS Seminar
22. UIUC YMCA Forum: Praxis and the Promise of Public Learning

### 2019

23. Massachusetts Institute of Technology, Aero/Astro Dept Seminar
24. ASME 2019 Smart Materials, Adaptive Structures, and Intelligent Systems, Bioinspired Materials and Structures Symposium Invited Speaker
25. Auburn University, Aerospace Department Seminar
26. Engineering for Everyone Community Forum at UIUC

### 2017-2018

27. IROS Robotics Inspired Biology Workshop (Invited Speaker)

28. Michigan University, Aerospace Engineering Seminar
29. Pennsylvania State University, Center for Acoustics and Vibrations Seminar
30. Embry Riddle University, Aerospace Engineering Department Seminar
31. University of Illinois at Urbana-Champaign, Decision and Control Seminar

## ✈ GRADUATE AND UNDERGRADUATE STUDENT MENTORING

\* = co-advised student

### A. Former Ph.D. Students

n	Student Name	Year Graduated	Placement
1	Chengfang Duan	2021	Wayfair, Boston MA
2	Oyuna Angatkina*	2021	Intuitive Surgical, Sunnyvale CA
3	Ophelia Bolmin	2021	Assistant Prof., Carnegie Melon University

### B. Current Ph.D. and Postdocs

n	Student Name	Year Graduated	Thesis Topic
4	Girguis Sedky	Postdoctoral Researcher	N/A
5	Diaa Zekry	Expected 2024, <a href="#">Crocco Award</a>	Feather-inspired Flight Control
6	Valeria Saro-Cortes	Expected 2025, NSF GFRP	Flying Fish Inspired Multimedial Locomotion
7	Paul Lee	Expected 2025	Grasshopper Inspired Multimodal Locomotion
8	Ahmed Othman	Expected 2025	Feather-inspired Flow Control
9	Teagan Mathur	G3, <a href="#">Larisse Rosentweig Klein Memorial Prize</a>	Click-beetle Inspired Energetics and Locomotion
10	Hannah Wiswell	G2, <a href="#">Crocco Award</a>	Avian-inspired Ground Effect Flight
11	Allison Earnhardt	G2, NSF GFRP	Origami-enabled Multimodal Locomotion

### C. M.S. Thesis Students

n	Student Name	Year Graduated	Placement (after degree)
12	Kimberly Gustafson	2019	Ph.D. Student at Univ of Minnesota
13	Luis Urrutia	2019	Accenture
14	Mihary Ito	2018	UIUC MBA Program
15	Ophelia Bolmin	2017	Ph.D. Student UIUC
16	Boris Mandadzhiev	2017	MKS Instruments
17	Josiah Waite	2017	NASA Langley
18	Michael Lynch	2017	Capital One
19	Jonathan Hoff *	2016	Ph.D. Student

## D. Undergraduate Research Advising (student name, term, and activity description)

\*\* = Princeton Students

n	Student Name, Term, and Activity Description
1	** Lilia Burtonpatel (2024-Present): Evolution of Slotted Primaries
2	** Hriday Unadkat (2024-Present): Ground Effect Experimental Setup
3	** Soloman Khan (2024-Present): Click Beetle Inspired Robot
4	** Alicia Lin (2023-Present): Flying Fish Pectoral Fin Design
5	** Patrick Kozak (2023-Present): Grasshopper Wing Imaging and Evaluation
6	** Jessica Yeh (2023): Deployable flap control
7	**Ariel Blumenberg (2022): Deployable flap control
8	**Juan Rohrer (2022): Bioinspired Wingtip Feathers
9	**Naomi Oke (2022): Flying Fish Pectoral Fin
10	**Yusuf Fashanu (2022): Bird-inspired Sweep Control
11	**Jack Monaco (2022): Ornithopter Avionics Package
12	**Jose Yanez (2022-2023): Flying Fish Robot
13	Yuhe Cui (2021-2022): Flying Fish Caudal Fin
14	Arsanious Boctor (2021-2022): Flying Fish Robot
15	Anushka Sandeep (2021-2022): Torsionally-hinged Coverts-inspired Flaps
16	Maxwell Marsh (2021): Flapping wing Mechanism
17	Seth Honningford (Summer 2021): Launcher for insect-scale glider
18	Fotios Vakakis (Summer 2021): Grasshopper Wing Structure
16	Tierney Dufficy (2020-2021): Flying Fish Caudal Fin
17	Anna Alvarez (2020-2021): M-Shaped Wing Morphing
18	Rebecca Napoli (2020): Origami Robot Segmentation Mechanism
19	Michael Gordon (Summer 2019): Origami Robot Segmentation Mechanism
20	Balaju Iyengar (Summer 2019): REU Flapping Wing Asymmetric Wing Gait
21	Logan McKee (Summer 2019): REU Flapping Wing Asymmetric Wing Gait
22	George Barton (Summer 2019): REU Flapping Wing Asymmetric Wing Gait
23	Rachit Singhvi (Summer 2019): Click Beetle Launcher
24	Kevin Murphy (2018-2019): Ornithopter Flight Package
25	Sumanyu Sigh (2018-2019): Origami-inspired Robot Controls
26	Sankhya Hirani (2018-2019): Material Characterization of Biological and Synthetic Materials
27	Kyung Jun (Paul) Lee (2018-2019): Ornithopter Stand Design
28	Ryan Lin (2018): 3D Printing of Soft Materials

29	Tianhao Zhao (2017-2018): Ornithopter Wing Morphing
30	Valentino Wilson (2017-2018): Click Beetle Prototyping
31	Daniel Yu (2017-2018): Composite Wingtips
32	Kevin Hart (2016-2018): 3D Printing + Wind Tunnel Testing
33	Michael Ye (2016-2017): Morphing wing
34	Brian Chien (2015-2017): Origami-Based Crawling Robot
35	Brian Franklin (2015-2017): Flapping Wing Controls
36	Brandon Leung (2015-2016): Multi-gait Locomotion using Origami
37	Madison Heimerdinger (2015-2016): Ornithopter Fabrication and Evaluation

## ✈ DESIGN-FOCUSED TEACHING

- **Aerospace Structures:** An introduction to aerospace structures, including an introduction to aerospace structures components and loads, elasticity, virtual work, and energy formulations, and analytical and numerical methods for analyzing aerospace structures, including idealization and finite Element Analysis (Princeton: 2023-Present)
- **Bioinspired Design:** A unique interdisciplinary advanced design experience in the field of bioinspiration. Students work in interdisciplinary teams throughout the semester and learn to integrate biology into engineering design. (UIUC and Princeton: 2017-Present)
- **Mechanical Design I:** Kinematics and dynamics of machinery, including analytical kinematics, force analysis, cam design, and balancing (UIUC:2015-Present)
- **Global Engineering Design Thinking, Innovation, and Entrepreneurship:** A course sequence (a, b, and c) that immerses students in a real-world, globally distributed engineering design experience in the spirit of a Silicon Valley start-up, teaching them to manage the chaos and ambiguity inherent in professional design (Stanford:2014-2015)
- **Mechanical System Design:** Design of custom mechanical components, selection of common machine elements, and selection of electric motors and transmission elements (Stanford:2014)
- **Structural Dynamics:** Advanced principles of dynamics necessary for structural analysis; solutions of eigenvalue problems for discrete and continuous elastic systems, solutions to forced response boundary value problems by direct, modal, and transform methods (Maryland: 2012-2013)

## ✈ SELECTED SERVICE ACTIVITIES

### A. External Service

#### i. Professional Society

- Co-lead for organizing the underrepresented minorities breakfast at APS-DFD (2024)
- Chair of SPIE Smart Structures and Nondestructive Evaluation: Behavior and Mechanics of Multifunctional Materials Conference (Chair 2021-2024)
- Co-Chair of SPIE Smart Structures and Nondestructive Evaluation: Behavior and Mechanics of Multifunctional Materials Conference (Co-Chair 2019-2021)
- Chair of ASME Smart Materials, Adaptive Structures, and Intelligent Systems: Bio-inspired Materials and Structures Symposium (Co-Chair: 2017-2018)

- Co-Chair of ASME Smart Materials, Adaptive Structures, and Intelligent Systems: Bio-inspired Materials and Structures Symposium (Co-Chair: 2016-2017, 2020)
- Chair of Bioinspired Materials and Structures Technical Committee (SMASIS Division of ASME) (2017-2018)
- Co-Chair Bioinspired Materials and Structures Technical Committee (SMASIS Division of ASME) (2016-2017)

#### ii. Workshop Organization

- Organizer for an NSF-sponsored Symposium at the Society of Integrative and Comparative Biology Annual Meeting (2022)- This is a competitive process that involves writing a proposal to the Society of Integrative and Comparative Biology and raising funds to secure travel for the symposium speakers.
- Organized an NSF Convergent Accelerator workshop at the Wyss Institute at Harvard University. This workshop resulted in a \$10.5M funding track for NSF (2022)
- Developed and delivered Bioinspired Design Wintersession (2022)
- Organized an NSF-funded workshop at the University of Illinois at Urbana-Champaign to inform the research theme for the bioinspired design institute (2021)

#### iii. Editorial and Referee Activities

- Associate Editor for the Journal of Intelligent Material Systems and Structures (2024-Present)
- Guest Editor for Integrative and Comparative Biology Journal (2022)
- Guest Editor for the Smart Materials and Structures (SMS) Journal (2017)
- Guest Editor for focus issue in Smart Materials and Structures (2015 and 2016)
- Scientific Referee for Smart Material and Structures, Journal of Intelligent Systems and Structures, SoRo, Journal of Experimental Biology, Nature, Science and Biomimetics and Bioinspiration (2014-Present)

#### iv. Federal and State Service

- National Science Foundation Engineering Directorate, Division of Civil, Mechanical and Manufacturing Innovation (CMMI) Committee of Visitors (2024)
- Subject Matter Expert Reviewer for the 2023 National Academies Assessment of the Army Research Laboratory (2023)
- Reviewer, Dynamics, Controls, and System Diagnostics NSF Panel (2023)
- Reviewer, Foundational Research in Robotics NSF Panel (2021)
- Reviewer, Mechanics of Materials and Structures NSF Panel (2017)
- Reviewer, Fluid Dynamics NSF Panel (2018)
- Reviewer, AFOSR Multi-scale Mechanics and System Prognosis Proposal Reviewer (2018)

## B. University, School, and Departmental Service (@ Princeton)

#### i. Course Development

- Developed a bio-inspired design course for undergraduate and graduate students in SEAS and EEB (2022)
- Developed a new aerospace structures course and secured funding from the 250<sup>th</sup> Anniversary Course fund to develop new materials and labs. (2023-2024)

#### ii. SEAS University-wide Service

- Council on Teaching and Learning (2022-2024)
- Robotics Core Faculty Member (2022-Present):
  - Designed, equipped, and launched the prototyping space in the new F-Wing Robotics Facility (2023)
  - Developed facilities usage and access policies (2022)

- Co-authored the robotics center and robotics minor proposals that were recently approved by the Academic Planning Group (2024)
- Panelist on:
  - Pathways into Academy Program (2022)
  - Pathways to Graduate School (2022)
  - CST Women in STEM (2023)
  - GSP First Friday: Faculty Conversation Series (2023)

### iii. Department Service

- Member, MAE Senior Search Committee (2024-Present)
- Member, MAE Future Building Committee (2023-Present)
- MAE Strategic Planning Committee (2023)
- Generals Exam Committee member and Dissertation reader (2022-Present)

n	Student Name	Academic Placement	Role
1	Hannah Williams	Ph.D. Student	Ph.D. Committee Member
2	Yenan Shen	Ph.D. Student	Ph.D. Committee Member
3	Victora Malarczyk	Ph.D. Student	Ph.D. Committee Member
4	Eric Lepowsky	Graduated	Dissertation Reader
5	Paul Kaneelil	Graduated	Dissertation Reader
6	Daniel Ruth	Graduated	Dissertation Reader

- Independent Study and Senior Thesis reader (2022-Present)

n	Student Name
1	Ariana Rausch
2	Nathan Gage
3	Jasper Waldman
4	Michael Hwang
5	Syndey Hsu

## SELECTED DIVERSITY, INCLUSION, AND OUTREACH ACTIVITIES

- Mentored several undergraduate researchers who are underrepresented minorities (URM) in STEM through numerous summer research projects (e.g., REU programs) and independent study programs (2015-Present)
- Recruited and currently leads a diverse research group consisting of 50% women and 87% URM graduate research assistants (2015-present)
- Graduated 8 M.S. students and 3 Ph.D. students and mentored more than 35 undergraduate research students at the Bio-inspired Adaptive Morphology Lab (2015-present)
- Planned, organized, and executed several events for high, middle, and elementary school girls and students (2015-Present)
  - Participated in several outreach events at Princeton, including Take Your Child to Work Day, hosting middle and elementary school students from underserved communities, and participating in events such as the Spring into Science 2024

- Participated in the Paper 2 Tree program for three years in a row to introduce URM 5<sup>th</sup> graders to flight and bioinspired design
- Led robotics-focused outreach events for a local elementary school
- Organized the Girls Build Awesome Machines and Explore Illinois STEM summer camp at UIUC
- Planned and secured funding for an outreach program in collaboration with the Office of minority student affairs (OMSA) to host a 6-week program introducing engineering to the Upward Bound Prep Academy participants. The program serves approximately 102 local underrepresented middle and high school students (2020-2022)
- Served as a mentor for the ARISE program, a 5-year program that provides academically talented students coming from low-income backgrounds to successfully earn their engineering degrees from the University of Illinois (2017-2019)

## ✈ SELECTED MEDIA COVERAGE

- Sedky et al. 2024 Media Coverage (21 news outlets): : <https://pnas.altmetric.com/details/169765221>
- Highlight on our bioinspired robotics work: <https://www.nature.com/articles/d41586-022-03014-x>
- Wang et al. 2023 Media coverage (28 news outlets): <https://pnas.altmetric.com/details/141689538/news>
- Article on our Wintersession course: <https://www.princeton.edu/news/2022/01/24/nothing-mandatory-nothing-graded-what-we-learned-wintersession>
- APS Highlight on our feather-inspired flow control: <https://www.aps.org/apsnews/2022/08/for-agile-flight-just-add-feathers>
- Bolmin et al. 2021 (16 news outlets): <https://pnas.altmetric.com/details/97995349/news>
- Wired-In Interview: [https://www.news-gazette.com/news/wired-in-aimy-wissa/article\\_3b61497c-70c8-5ea9-9226-2801f2629dad.html](https://www.news-gazette.com/news/wired-in-aimy-wissa/article_3b61497c-70c8-5ea9-9226-2801f2629dad.html)
- Article on our origami-enabled robots: <https://3dprint.com/186852/flexible-inching-robot-research/>
- Highlight on our work in Bird-inspired UAVs: <http://insideunmannedsystems.com/drones-take-wing/>