

# Andrew Schulz, Ph.D.

Postdoctoral Researcher - Max Planck Institute for Intelligent Systems

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## EDUCATION

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**Ph.D. - Mechanical Engineering** 2018-2022

*Georgia Institute of Technology - Atlanta, GA*

Thesis advisor: David Hu, Thesis on Mechanics and Materials of the Elephant Trunk with Applications to Conservation Technology

**B.S. Mathematics** 2013-2018

*Oklahoma State University - Stillwater, OK*

Research Advisor: Paul Fili, Undergraduate Thesis on Constructing Translation and Scaling Invariant Function of the Energy of Music Intervals

**B.S. Mechanical Engineering** 2013-2018

*Oklahoma State University - Stillwater, OK*

Academic Advisor: Kaan Kalkan

## EXPERIENCE

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**Postdoctoral Researcher** 2023-Present

*Max Planck Institute for Intelligent Systems*

- Research in the Haptic Intelligence Department under the advisement of Dr. Katherine Kuchenbecker
- Studying organismal haptics of elephant whiskers, skin sensory, and tactile bird bills
- Working on bio-inspired haptic sensors based on animal sensing through modeling and mimic creation

**Associated Scientist** 2023-Present

*International Max Planck Research School for Intelligent Systems*

- Collaborate with scholars and faculty to facilitate learning, as we aim to create a highly interdisciplinary environment for our doctoral researchers
- Help the Max Planck Intelligent Systems Community in fields of biomimicry, AI for good, and biomechanics

**Postdoctoral Researcher** 2022-2023

*Max Planck Institute for Intelligent Systems*

- Research in the Locomotion in Biorobotic and Somatic Systems (LBaSS) Group under the advisement of Dr. Ardian Jusufi
- Studying tail movement in cheetahs to create robotic tail to assist in robotic turning

**Executive Board Member** 2022-Present

*Engineering for One Planet Network*

- [Engineering for One Planet](#) (EOP) is a global initiative to equip all engineers across all disciplines with the fundamental skills and principles of environmental and social sustainability.
- I'm currently working to leverage Conservation Technology into the EOP global initiative as a Postdoctoral Network Consultant.

## **Biomimicry Launchpad**

2023-2023

*Biomimicry Institute*

- Selected as one of 16 of over 100 people from around the world nominated to the 2023 Biomimicry Launchpad cohort working to help investors bring their ideas to commercialization
- Worked on understanding startup commercialization in biomimicry research with scientists from 5 continents

## **Graduate Research Assistant**

2018-2022

*Georgia Institute of Technology*

- Research on kinematic limitations and capabilities of elephant trunks and how their allometry impacts this
- Studying elongation capability of trunk skin as well as how different hairs on elephant skin allow it to understand environment
- Understanding Conservation Issues and using Engineering Solutions with Western Lowland Gorillas, Burmese Pythons, Giant Pandas, and African Bush Elephants

## **Graduate Research Assistant**

2020-2022

*Georgia Tech Research Institute*

- Teaching and Leading two project-based courses HumaniTech and GaTech4Conservation
- Manage and Develop over 15 different projects for 50 students to engage and work on in 6 continents and 12 countries around the world
- Students are working to advance sustainable engineering solutions to public health and wildlife conservation

## **Community Manager**

2022-Present

*WILDLABS Network*

- [WILDLABS](#) is a global community of conservation technology educators, practitioners, developers, and changemakers. I am currently leading their education, teaching, and learning community.
- We currently are working to advance the WILDLABS network through the use of the

## **Graduate Teaching Fellow**

2020-2022

*Georgia Institute of Technology*

- Developing new teaching focus on Conservation and Sustainability Education
- Assist with classroom observations and individual consultations with TAs and postdocs
- Develop and Facilitate TA orientation and workshops for new and returning Teaching Assistants

## **Education Consultant**

2020-2021

*ConservationX Labs*

- Developed online course curriculum for undergraduate students to become engaged in co-creating technologies with communities
- Developed the Conservation Future Toolkit on Technology for Environmental Impact, [Online Course Module](#)
- Assisted with creating a module for wildlife technology using different case studies

## **AWARDS**

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- Best Paper Award - American Society of Engineering Education, Environmental Engineering Division - 2022
- Career, Research, and Innovation Development Conference - Provost Best Student Poster Award - 2022

- Student Recognition of Excellence in Teaching: 2021 CIOS Award
- Georgia Institute of Technology Presidential Fellowship - 2018, 2019, 2020, 2021
- New York Times Top 5 Science of Animals Stories - 2021
- [Global RCE Network Award Winner](#) - Building Effective ESD in Higher Education through Multi-Institution and Community Collaboration - 2021
- Georgia Institute of Technology - Class of 1941 CIOS Honor Roll - Spring 2021
- Georgia Institute of Technology - Vertically Integrated Project Instructor of the Year Award - Spring 2021
- Center for the Integration of Research, Teaching, and Learning (CIRTL) Associate Level Certificate - Spring 2021
- American Physical Society Division of Biological Physics Travel Award - 2020
- Advised 7 Presidents Undergraduate Research Assistantship Awards

## **PUBLISHED PEER-REVIEWED JOURNAL PAPERS**

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10. Chellapurath, M., Khandelwal, P., **Schulz, A.K.**, [“Bioinspired Robots Can Foster Nature Conservation”](#), *Frontiers in Robotics and AI* **10**, 1-10 (2023).
9. **Schulz, A.K.\***, Shriver, C., Seleb, B., Weigel, E., Mendelson, J., Chang, Y., Bhamla, S., Hu, D., [“Conservation tools: the next generation of engineering–biology collaborations”](#), *Journal of the Royal Society Interface* **20**, 205 (2023).
8. **Schulz, A.K.\***, Zhang, M., Schneider, N., Singal, K., [“A Year at the Forefront of Hydrostatic Motion”](#), *Biology Open* **12**, 8 (2023).
7. **Schulz, A.K.\***, Zhang, M., Jadali, N., Meyerchick, J., Hu, D.L., [“ForageFeeder: Open Source modular feeders for captive primates”](#), *HardwareX* **e00405**, (2023).
6. **Schulz, A.K.**, Wu, J.N., Tang, C.Y., Reidenberg, J.S., Elgart, N., Hu, D.L.\*, [“Elephants have an adaptable prehensile grip”](#), *Bio-inspiration and Biomimetics* **18**, 026008 (2023).
5. Magondu, B., Lee, A.B., **Schulz, A.K.** Yang, P., Buchelli, G., Meng, M., Kaminski, C., Carver, S., Hu, D.L.\*, [“Drying dynamics of pellet feces”](#), *Soft Matter* , (2023).
4. **Schulz, A.K.**, Boyle, M., Boyle, C., Sordilla, S., Rincon, C., Hooper, S., Aubuchon, C., Reidenberg, J.S., Higgins, C., Hu, D.L.\*, [“Skin wrinkles and folds enable asymmetric motion in the elephant trunk”](#), *Proceedings of the National Academies of Sciences (PNAS)* **119**, 31 (2022).
3. **Schulz, A.K.**, Shriver, C., Aubuchon, C., Weigel, E., Kolar, M., Mendelson III, J.R., Hu, D.L.\*, [“A guide towards successful research collaborations between zoos and universities”](#), *Integrative and Comparative Biology* **62**, 5 (2022).
2. **Schulz, A.K.**, Mohebbi, N., Spencer, T., Pos, K., Mandel, A., Casas, J., Hu, D.L.\*, [“The scaling of olfaction: Moths have relatively more olfactory surface area than mammals”](#), *Integrative and Comparative Biology* **03**, (2022).

1. **Schulz, A.K.**, Wu, J.N., Shumate, D., Slade, S.B., Rivera, S., Hu, D.L.\*, “[Suction feeding by elephants](#)”, *Royal Society Interface* **18**, 179 (2021).

\* indicates the corresponding author on the publication.

## **PEER-REVIEWED CONFERENCE PAPERS - PUBLISHED**

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5. **Schulz, A.\***, Anderson, C.D., Cooper, C., Roberts, D., Loyo J., Rolf, J., Lewis, K., Granda, N., Kumar, S.N, “[Toolkit for Expanding Sustainability Engineering Utilizing Foundations of the Engineering for One Planet Initiative](#)”, *Proceedings of American Society of Engineering Education* , (2023).
4. **Schulz, A.\***, Shriver, C., Stathatos, S., Moore, R., “[Utilizing Online & Open-Source Machine Learning Tool-kits to Leverage the Future of Sustainable Engineering](#) ”, *Proceedings of American Society of Engineering Education* , (2023).
3. **Schulz, A.**, Patka, A., Shriver, C., Seleb, B., Greiner, C., Zhang, M., Jadali, N., Hu, D.L., Moore, R., “[A Foundational Design Experience in Conservation Technology: A Multi-Disciplinary Approach to meeting Sustainable Development Goals](#)”, *Proceedings of the ASEE Annual Conference* **4**, (2022).
2. **Schulz, A.**, Seleb B., Greiner, C., Shriver, C., Hu, D.L., Moore, R., “[Toward the UN’s Sustainable Development Goals \(SDGs\): Conservation Technology for Design Teaching & Learning](#)”, *Proceedings of the ASEE SE Regional Annual Conference* **4**, T4-A (2022).
1. **Schulz, A.**, Fourney, E., Sordilla, S., Sukhwani, A., Hu, D.L., “[Elephant Trunk Skin: Nature’s Flexible Kevlar](#)”, *Proceedings of the IROS 2020* **4**, T4-A (2022).

## **WORKING PAPERS**

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14. **Schulz, A.**, Reveyaz, N., Kaufmann, L., Hildebrandt, T., Brecht, M.\*, “[Elephants develop wrinkles through both form & function](#)”, *bioRxiv* , (2023).
13. **Schulz, A.\*** Chellapurath, M., Khandelwal, P., Rezaei, R., Merker, S., Jusufi, A., “[Squirrel Slippage Solved through Spiky Scaly Substrate](#)”, *in review* , (2023).
12. **Schulz, A.**, Plotczyk, M., Sordilla, S., Boyle, M., Singal, K., Reidenberg, J.S., Hu, D., Higgins, C., “[Second Harmonic Generation Imaging Reveals Entanglement fo Collagen Fibers in the Elephant Trunk skin Dermis](#)”, *bioRxiv* , (2023).
11. **Schulz, A.\***, Shriver, C., Patka, A., Greiner, C., Seleb, B., Watts-Hull, R., Sullivan, C., Wallace, R., Moore, R., “[Intradisciplinary Growth of Sustainability-Minded Engineers through Conservation Technology](#)”, *bioRxiv* , (2023).
10. **Schulz, A.**, Rottier, T., Sohnel, K., McCarthy, K., Patel, A., Andrada, A., Jusufi, A.\*, “[Tail wags the dog is unsupported by biomechanical Modeling of Canidae Tails Use during Terrestrial Motion](#)”, *bioRxiv* , (2023).
9. **Schulz, A.\***, Irick, E., O’Brien, C., Seleb, B., “[An inexpensive modular open source, low mass GPS tracker for conservation research](#)”, *in review* , (2023).

8. **Schulz, A.\***, Gouge, A., Madliger, C., “Expanding Conservation Science through Emerging Interdisciplinary Fields”, *In Review* , 2023 () .
7. Singal, K. Berez, J., Day, T., Jost, E., Hu, D.L., Yunker, P., **Schulz, A.\***, “Mechanical Entanglement of Keratin gives Rhino Horns more Robust Impact Resistance”, *in preparation* , (2023).
6. Rokhmanova, N.,**Schulz, A.**, “Figuring It Out: How to Master the Art of Scientific Visuals” , 2023 (In preparation).
5. **Schulz, A.**, Serhat, G., Kuchenbecker, K.J., “Adapting a high-fidelity simulation of human skin for comparative touch sensing in the elephant trunk” , 2023 (In preparation).
4. **Schulz, A.**, Kaufmann, L., Yang, D., Zhang, D., Brecht, M., Richter, G., Kuchenbecker, K.J., “Whiskers that don’t whisk: Unique structure from the absence of actuation in elephant whiskers” , 2023 (In preparation).
3. **Schulz, A.\***, Hansen, G., Palakurthy, I., Shriver, C., Marple, D., Paterno, A., Blystone, C., Place, S., Hu, D., Weigel, E., “Creating a non-invasive oral rabies vaccination network using a combination of trail cams, computer vision, and automated feeders” , (In preparation).
2. **Schulz, A.**, Dimitriyev, M., Singal, K., Sordilla, S., Boyle, C.J., Plotczyk M., Boyle, M., Reidenberg, J.S., Higgins, C., Matsumoto, E.\*, “Programmable Collagen Materials weaved through entangled yarn” , (In preparation).
1. **Schulz, A.**, Kaufmann, L., Hildebrandt, T., Brecht, M.\*, “A functional review of elephant trunk morphology, mechanics, and sensory” , (In preparation).

## **BOOK CHAPTER**

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- **Schulz, A.**, Hooper, S., “**Proboscidea morphology**”, *Encyclopedia of Animal Cognition and Behavior Springer International Publishing*, 2020 (1-6).

## **FUNDED RESEARCH GRANTS [\$222,500 - Awarded]**

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11. Woodruff School New Faculty Seed Funding, “Programmable Exo-skins to optimize limb-joint impedance and augment human movement”, \$25,000 (Grant Writer & Collaborator, 8/22-8/23).
10. National Science Foundation: DRL, “Students and Teaching Learning from Nature: Studying Biologically-Inspired Design in High School Engineering Education”, \$5,000 (Collaborator, 4/2-6/22).
9. Army Research Office URAP& HSAP, “Determining Muscle Output of Elephant Trunks” , \$9,000 (Grant Writer - Awardee, 4/22-8/22).
8. Army Research Office URAP, “Creating Bio-Inspired Elephant Trunk Skin based on Tissue Mechanics Modeling” , \$9,000 (Grant Writer - Awarded, 4/21-6/21).
7. DARPA SenSARS, “Construction of Conservation Technology Devices for Zoological Housed Species” , \$119,000 (Graduate Grant Writer - Awarded, 1/21-4/21).

6. Zoo Atlanta Research Collaboration Grant, “Construction of Conservation Technology Devices for Zoological Housed Species”, \$1,500 (Grant Writer, Awardee & Co-PI, 4/20-4/22).
5. European Hair Research Society Research Collaboration Grant, “African Elephant Sensing Capabilities through Proboscis Vibrissal Hairs”, \$2,500 (Grant Writer & Awardee, 4/19-12/19).
4. Smith gall-Watts Grant, “How Elephant Trunks Traverse an Array of Pegs”, \$14,000 (Grant Writer & Awardee, 8/18 - 8/19).
3. Georgia Tech Research Institute, “Teaching STEM Majors about Sustainability, Public Health, and Wildlife Conservation”, \$25,000 (Grant Writer - Awarded, 8/20-4/21).
2. European Hair Research Society, “Looking at the morphology and structure of elephant trunk whiskers student grant”, \$5,000 (Grant Writer - Awarded, 8/19-4/20).
1. Army Research Office URAP& HSAP, “Bio-mechanics of Elephant Trunks and Fire Ants”, \$7,500 (Grant Writer - Awardee, 4/20-8/20).

## TEACHING

Instructor Effectiveness\* on the table is from the course instructor opinion surveys (CIOS) done at Georgia Tech, which were anonymous reviews of students for instructors with the answers shown as averages of the question, Rate the overall effectiveness of the instructor from 1 (not effective) to 5 (extremely effective).

| Course Name              | Semester    | Role             | Students | Effectiveness* (X/5) |
|--------------------------|-------------|------------------|----------|----------------------|
| Figure Workshop          | Fall 2023   | Co-IOR           | 23       | N/A                  |
| HumaniTech VIP           | Fall 2022   | Co-IOR           | 26       | 4.99                 |
| HumaniTech VIP           | Spring 2022 | IOR              | 18       | 4.95                 |
| Tech4Wildlife VIP        | Spring 2022 | IOR              | 22       | 5                    |
| HumaniTech VIP           | Fall 2021   | IOR              | 25       | 4.93                 |
| Tech4Wildlife VIP        | Fall 2021   | IOR              | 15       | 5                    |
| HumaniTech VIP           | Spring 2021 | IOR              | 24       | 5                    |
| Tech4Wildlife VIP        | Spring 2021 | IOR              | 20       | 5                    |
| HumaniTech VIP           | Fall 2020   | IOR              | 30       | N/A                  |
| Tech4Wildlife VIP        | Fall 2020   | IOR              | 12       | N/A                  |
| Tech4Wildlife VIP        | Spring 2020 | TA               | 8        | N/A                  |
| HumaniTech VIP           | Fall 2019   | TA               | 40       | N/A                  |
| Tech4Wildlife VIP        | Fall 2019   | TA               | 4        | N/A                  |
| Intro to Modern Analysis | Spring 2018 | TA, Grader       | 20       | N/A                  |
| Intro to Cryptography    | Spring 2018 | TA, Grader       | 14       | N/A                  |
| Differential Equations   | Fall 2017   | TA, Section Lead | 32       | N/A                  |
| Differential Equations   | Spring 2017 | TA               | 36       | N/A                  |

- Workshop: **Creating Scientific Visualizations for Presentations, Publications, Posters**  
Co-led the creation of a Scientific Visualizations seminar for new PhD students into the International Max Planck Research School for Intelligent Systems at the Annual boot camp. Outcome was a GitHub that is available for all participants. GitHub can be found [here](#).
- MOOC: **Conservation Future Toolkit**  
Co-led the creation of the Technology for Environmental Impact Massive Online course through ConservationX Labs. The module is an online free-to-learn course for students to learn how to implement equitable technology intervention. Created for environmental engineers to gain insight into conservation tech.
- VIP 2601/3601/4601/6601: **HumaniTech - VIP**  
Instructor of Record (IOR) for undergraduate and graduate students working on designing technology for public health concerns, including food deserts, nutrition education, and disaster relief. Average effectiveness as instructor 4.97/5.00 from 65 unique students.
- VIP 2601/3601/4601/6601: **GaTech4Wildlife - VIP**  
Instructor of Record (IOR) for undergraduate and graduate students working on designing technology for wildlife conservation, including reduction of invasive species, vaccination of urban wildlife, and zoo-collaborations for animal welfare. Average effectiveness as instructor 4.99/5.00 from 45 unique students.
- MATH 4023/5021: **Intro to Modern Analysis**  
Worked as a TA and grader for course helping hold office hours for students struggling on homework
- MATH 4753/5753: **Introduction to Cryptography**  
Worked as grader for course for graduate and undergraduate students
- MATH 2302: **Differential Equations**  
Worked as a TA for differential equations course as well as a recitation lead for 30 students each week on honors differential equations.

## **CONFERENCE POSTERS, TALKS, AND WORKSHOPS**

68. Singal, K., **Schulz, A.**, Dimitriyev, M., Matsumoto, S., “Simplifying the Wrinkled Complexity of Elephant Trunks using Knitted Biomimicry”, *Oral presentation at Society of Integrative and Comparative Biology*, Submitted, (Seattle, WA - January 2024).
67. **Schulz, A.**, Serhat, G., Kuchenbecker, K., “Adapting a high-fidelity simulation of human skin for comparative touch sensing in an elephant trunk”, *Poster presentation at Society of Integrative and Comparative Biology*, Submitted, (Seattle, WA - January 2024).
66. **Schulz, A.**, Kaufmann, L, Brecht, M., Richter, G., Kuchenbecker, K., “Whiskers that don’t whisk: Unique structure from the absence of actuation in elephant whiskers”, *Oral presentation at Society of Integrative and Comparative Biology*, Submitted, (Seattle, WA - January 2024).
65. **Schulz, A.**, Hutchins, D., “SICB plus Biomimicry, in Education, Research, and Innovation”, *Workshop at Society of Integrative and Comparative Biology*, Submitted, (Seattle, WA - January 2024).

64. Sordilla, S., **Schulz, A.**, Plotsyk, M., Hu, D., Higgins, C., “Collagen entanglement in elephant skin gives way to strain-stiffening mechanisms”, *Oral presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
63. Kaufmann, L, **Schulz, A.**, Reveyaz, N., Ritter, C., Hildebrandt, T., Brecht, M., “Elephants develop wrinkles through both form and function”, *Oral presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
62. Zhang, M., Shriver, C., Mendelson, J., **Schulz, A.**, “Creating successful zoo-academic collaborations through education, enrichment, and engagement”, *Oral presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
61. Shriver, C., Davidson, A., Chang, Y.H., Hu, D., Mendelson, J., Wiech, S., **Schulz, A.**, “Zoo Biomechanics and Biomimicry Day: One event for thousands to learn about zoo research”, *Poster presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
60. Shriver, C., Davidson, A., Chang, Y.H., Hu, D., Mendelson, J., Wiech, S., **Schulz, A.**, “Defining Mammalian Climbing Gaits and their influence criteria including morphology and mechanics”, *Oral presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
59. Rubenson, J., Arellano, C., Arias, A., Daley, M., Dick, T., Holt, N., Manafzadeh, A., Richards, C., Sawicki, G., **Schulz, A.**, “Comparative Neuromuscular Biomechanics (CNB): The Intersection of Comparative and Human Biomechanics”, *Poster presentation at Society of Integrative and Comparative Biology* , Submitted, (Seattle, WA - January 2024).
58. **Schulz, A.**, Rakamaniva, N., “Explaining scientific findings through figures in publications, presentations, and posters”, *Workshop presentation at the IMPRS IS Fall Bootcamp* , Accepted (Stuttgart, Germany - September 2023).
57. **Schulz, A.**, “Learning from Animals: Bioinspiration & Biomimicry”, *Oral Open House presentation at the IMPRS IS Fall Bootcamp* , (Stuttgart, Germany - September 2023).
56. Shriver, C., Davidson, A., Chang, Y.H., Hu, D., Mendelson, J., Wiech, S., **Schulz, A.**, “Put Me in the Zoo: Research and Outreach at a Zoo Biomechanics Day”, *Oral presentation at American Society of Biomechanics* , (Knoxville, TN - August 2023).
55. Shriver, C., **Schulz, A.**, Scott, D., Elgart, J., Mendelson, J., Hu, D., Chang, Y.H., “Defining Mammalian Climbing Gaits and their Influential Criteria”, *Oral presentation at American Society of Biomechanics* , (Knoxville, TN - August 2023).
54. **Schulz, A.**, Zhang, M., Singal, K., Matsumoto, S., “Viewing the Elephant Trunk as an Engineer learning Biology”, *Poster presentation at American Society of Biomechanics* , (Knoxville, TN - August 2023).
53. Madliger, C., **Schulz, A.**, “Conservation Physiology and Expansion of Conservation Science as a field”, *Oral presentation at Society of Experimental Biology* , (Edinburgh, UK - June 2023).
52. **Schulz, A.**, “How can we teach engineers about Machine Learning and Computer Vision while understanding sustainability”, *Oral presentation at American Society of Engineering Education* , (Baltimore, MD - June 2023).
51. **Schulz, A.**, Rolf, J., Anderson, C., “Engineering for One Planet: A Toolkit for Sustainability Education Outreach”, *Oral presentation at American Society of Engineering Education* , (Baltimore, MD - June 2023).



50. Zhang, M., **Schulz, A.**, Shriver, C., Mendelson, J., Hu, D.L., Chang, Y.H., “In-vivo work loop analysis of the African Elephant Trunk”, *Poster Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 6, 2023).
49. **Schulz, A.**, Shriver, C., Seleb, B., Bhamla, S., Chang, Y.H., Hu, D.L., “A Review of Advancing Conservation Practices Using Conservation Tools”, *Poster Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 6, 2023).
48. **Schulz, A.**, Rader, J., Patel, A., Jusufi, A., “Creating Improved Conservation Re-introductions using observational biomechanics of the Cheetah”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 6, 2023).
47. O’Brien, C., **Schulz, A.**, “SciComm that reaches millions through live streaming platforms Twitch YouTube”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 5, 2023).
46. Shriver, C., Scott, D., Palakurthy, I., Hansen, G., Place, S., Weigel, E., Hu, D.L., **Schulz, A.**, “Creating Interdisciplinary Conservation Tools: A Case Study of Vaccinating Urban Wildlife”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 5, 2023).
45. Shriver, C., Zhang, M., Wiech, S., Hu, D.L., Chang, Y.H., Mendelson, J., **Schulz, A.**, “Implementing a Zoo Biomechanics Day to Improve Public Outreach”, *Poster Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 4, 2023).
44. Jadali, N., Zhang, M., Gartner, M., Meyerchick, J., Carrigan, J., Mendelson J., Hu, D.L., **Schulz, A.**, “Improving Foraging Behavior using a Low-Cost DIY ForageFeeder”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 4, 2023).
43. Singal, K., **Schulz, A.**, Dimitriyev, M., Kirschner, S., Hu, D.L., Higgins, C., Matsumoto, E., “Untangling the Collagen of Elephant Skin using Knitted Mimics”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Austin, TX - January 2023).
42. **Schulz, A.**, Greiner, C., Shriver, C., Patka, A., Zhang, M., Jadali, N., Hu, D.L., Moore, R., “The next generation of Conservation Technologists through interdisciplinary education”, *Poster Presentation at American Society of Engineering Education Conference (ASEE) Conference* , (Minneapolis, MN - June 8, 2022).
41. **Schulz, A.**, Shriver, C., Patka, A., Zhang, M., Jadali, N., Hu, D.L., Moore, R., “A Foundational Design Experience in Conservation Technology: A Multi-Disciplinary Approach to meeting Sustainable Development Goals”, *Oral Presentation at American Society of Engineering Education Conference (ASEE) Conference* , (Minneapolis, MN - June 6, 2022).
40. **Schulz, A.**, Boyle, M., Singal, K., Matsumoto, S., Hu, D.L., “Collagen inspired Mimics of Elephant Tissue”, *Oral Presentation at International Physics of Living Systems (iPOLs) Conference* , (Montpellier, France - May 6, 2022).
39. Singal, K., **Schulz, A.**, Hu, D.L., “De-tangling the Strength of the Rhinoceros Horn”, *Poster Presentation at American Physical Society March Meeting* , (Chicago, IL - March 30, 2022).
38. **Schulz, A.**, Hu, D.L., “Creating bio-inspired tissue mimics of African elephant trunks’ wrinkled and folded skin”, *Oral Presentation at American Physical Society March Meeting* , (Chicago, IL - March 30, 2022).

37. Sullivan, C., **Schulz, A.**, “From HIPs to SDGs: Why the UN Sustainable Development Goals should be in your course and how to get started”, *Recorded seminar at University System of Georgia Teaching and Learning Conference* , (Atlanta, GA - March 30, 2022).
36. **Schulz, A.**, Boyle, M., Boyle, C., Sordilla, S., Hooper, S., Reidenberg, J., Higgins, C., Mendelson, J., Hu, D.L., “The Muscular Multi-tool: Biomechanics of Elephant Trunk from Macro to Micro”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Phoenix, AZ - January 2, 2022).
35. Sordilla, S., **Schulz, A.**, Hu, D.L., “Compositional Insights of Elephant Skin using Second Harmonic Generation Microscopy”, *Poster Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Phoenix, AZ - January 2, 2022).
34. Boyle, M., **Schulz, A.**, Hu, D.L., “Elongation Mechanics in the Elephant Trunk”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Phoenix, AZ - January 2, 2022).
33. **Schulz, A.**, Irick, E., O’Brien, E., Hu, D.L., “Modular, Low Cost, Open Source GPS trackers for Research Applications”, *Poster Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Phoenix, AZ - January 2, 2022).
32. Shriver, C., **Schulz, A.**, Hu, D.L., “Using a human-wildlife centered design framework in a project-based course to teach STEM majors about technology for wildlife”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Phoenix, AZ - January 2, 2022).
31. Singal, K., **Schulz, A.**, Hu D.L., Matsumoto, S., “Creating Bio-inspired Collagen Fiber mimics using knitted fabrics”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
30. Boyle, M., **Schulz, A.**, Ayala J., Hu D.L., “Asymmetric elongation of the Trunk to the skin”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
29. Irick, E., O’Brien, C., **Schulz, A.**, Hu D.L., “Low-cost and open source modular GPS trackers for research and conservation”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
28. Shriver, C., Greiner, C., Patka, A., **Schulz, A.**, Hu D.L., Moore, C., “Educating the next generation of Conservation Technologists: A Case study discussing Zoo Collaborations”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
27. Zhang, M., Jadali, N., **Schulz, A.**, Hu D.L., “Improving Foraging Behavior of Captive Gorillas using an open source toolkit”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
26. Hansen, G., Palakurthy, I., **Schulz, A.**, Ayala J., Hu D.L., “Automated and Autonomous vaccination of targeted species”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
25. Sahin, A., **Schulz, A.**, Ayala J., Hu D.L., “Creating Elephant Trunk mimics to design new bio-inspired materials”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).

24. **Schulz, A.**, Hu D.L., “Elephant Trunk biomechanics and the bio-inspiration elephants provide”, *Society of Integrative and Comparative Biology Southeastern Regional Meeting 2021* , (Atlanta, GA - November 6, 2021).
23. Zhao, W.,**Schulz, A.**, Rong, H., Ayala, J.,McGowan, C., Hul, D.L. , “Panda Climbing Techniques”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Web Conference - January 2, 2021).
22. Fourney, E., Sukhwani, A., **Schulz, A.**, Hu, D.L., “Wrinkles and folds enable stretching of elephant trunk skin”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Web Conference - January 2, 2021).
21. Boyle, M., **Schulz, A.**, Hu, D.L., “Elephant trunks expand in volume when reaching for distant objects”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Web Conference - January 2, 2021).
20. Sordilla, S., **Schulz, A.**, Hu, D.L., “Skin morphology and microstructure in the elephant trunk”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Web Conference - January 2, 2021).
19. **Schulz, A.**, Seleb B., Wallace R.,Hu D.L., “Conservation technology through multidisciplinary undergraduate teams”, *Oral Presentation at International Society of Integrative and Comparative Biology Annual Conference* , (Web Conference - January 2, 2021).
18. Sordilla, S., **Schulz, A.**, Hu, D.H., “Skin morphology and microstructure in the elephant trunk”, *Oral Presentation at Southeast regional Society of Integrative and comparative biology* , (Web Conference - November 14, 2020).
17. Seleb B., **Schulz, A.**, Wallace R.,Hu D.L., “Elephant Trunk Skin” Nature’s Flexible Kevlar”, *Poster Presentation at International Conference on Intelligent Robots and Systems(IROS)* , (Web Conference - September 24, 2020).
16. **Schulz, A.**, Fourney E., Sordilla S., Sukhwani A., Hu D.L., “Stretching the Truth...About Elephant Trunks”, *Poster Presentation at Animal Behavior Society* , (Web Conference - June 11, 2020).
15. Seleb B., **Schulz, A.**, Hu D.L., “Creating a Conservation Technology Education Course ”, *Oral Presentation at ConservTex Conference* , (Web Conference - May 8, 2020).
14. **Schulz, A.**, Plotzyk M., Julia, Boyle C.,Hu D.L., Higgins C., “African Elephant Sensing Capabilities through Proboscis Vibrissal hairs”, *Poster Presentation at European Hair Research Association Annual Conference - Accepted* , (Sheffield, United Kingdom, June 24, 2020).
13. **Schulz, A.**, Hu D.L., “Elephant Husbandry, Research, and Conservation Education”, *Oral Presentation at Next Generation of Elephant Management Conference* , (Tampa Bay, FL, May 24, 2020).
12. **Schulz, A.**, Lee S., Hu D.L., “The Elephant Trunk: Nature’s Soft Manipulator”, *Poster Presentation at Active Sensing: From Animals to Robots - Accepted* , (Rehovot, Israel, March 24, 2020).
11. **Schulz, A.**, Boyle C., Higgins C., Hu D.L., “African Elephant Sensing Capabilities through Skin and Hair”, *Oral presentation at American Physical Society Annual March Meeting* , (Denver, CO, March 3, 2020).
10. **Schulz, A.**, Rincon C., Hu D.L., “Elephant Trunks Behave like Telescoping Poles”, *Oral Presentation at Society of Integrative and Comparative Biology 2020 National Meeting* , (Austin, TX, January 6, 2020).

9. **Schulz, A.**, Ayala J., Zhao W., Rong H., Hu D.L., “Panda Cub Climbing for Conservation”, *Oral Presentation at Society of Integrative and Comparative Biology 2020 National Meeting* , (Austin, TX, January 4, 2020).
8. **Schulz, A.**, Ayala J., Zhao W., Rong H., Hu D.L., “Using Climbing to Grade Panda Cubs for Reintroduction”, *Oral Presentation at Annual Conference of Chinese Committee of Giant Panda Breeding Techniques* , (Chengdu, China, November 8th, 2019).
7. Zhao R., **Schulz, A.**, Ayala J., Hu D.L., “Climbing Ability of Giant Pandas”, *Society of Integrative and Comparative Biology 2019 Meeting* , (Winston Salem, NC, October 26, 2019).
6. Seleb B., **Schulz, A.**, Wallace R., Hu D.L., “Engineering Effective Elephant Encounters”, *Society of Integrative and Comparative Biology 2019 Meeting* , (Winston Salem, NC, October 26th, 2019).
5. **Schulz, A.**, Hu D.L., “Mechanics of Elephant Trunk Wrinkles”, *Oral presentation at American Physical Society Annual March Meeting* , (Boston, MA, March 7, 2019).
4. **Schulz, A.**, Lee A., Wheeler-Toppen J., “Fantastic Phenomena: How research on the physics and biology of animal motion can drive 3D Lessons”, *Oral presentation at Georgia Science Teachers Association Annual Meeting* , (Columbus, GA, February 15, 2019).
3. **Schulz, A.**, Wu J, Hu, D.L., “Elephants wrap their trunks around objects to better distribute forces”, *Oral presentation at Society of Integrative and Comparative Biology 2019 National Meeting* , (Tampa Bay, FL, January 5, 2019).
2. **Schulz, A.**, Wu J, Hu, D.L., “How an elephant trunk lifts and wraps”, *American Physical Society Division of Fluid Dynamics National Conference* , (Atlanta, GA, November 19, 2018).
1. **Schulz, A.**, Wu J, Hu, D.L., “Elephant Power Lifters”, *Society of Integrative and Comparative Biology 2018 Meeting* , (Clemson, SC, November 10, 2018).

## INVITED TALKS

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25. University of Stuttgart *Biomechanics of Elephant Trunks: Mechanics, Morphology, and Conservation*, Stuttgart Biomechanics Seminar Series, Stuttgart, Germany - 11/22/23, Accepted
24. Cornell *Helping Engineering find a Sustainable World through the Engineering for One Planet Framework*, Engineering for a Sustainable World Conference , Ithica, NY - 11/12/23, Accepted
23. Arizona State University *How can Machine Learning, Biomechanics, and Biomimicry aide in Conservation*, Engineering for One Planet Conevening, Pheoniz, AZ - 11/9/23, Accepted
22. The Royal Society *Viewing the Elephant Trunk Across Scales*, Invited Lecture Series on during Open Source Week, 10/22/23 - Accepted
21. City University Hong Kong *Viewing the Elephant Trunk Across Scales*, Comparative Morphology Faculty Invited Speaker Series, 10/18/23 - Accepted
20. Audiomoth Annual Conference *Using Open Source Conservation Tech for Education and Research*, Audiomoth and Bio-acoustic for Conservation Annual Conference , 9/28/23 - Accepted
19. International Society of Biomechanics *How does an engineer look at an elephant trunk*, CNB Biomechanics Society Invited Speaker, Fukuoka, Japan - 8/1/23

18. Max Planck Institute for Intelligent Systems *Mechanics and Materials of Elephant Trunk with Applications to Conservation Technology*, Invited Talk in the Haptic Intelligence Department, Stuttgart, Germany - 3/2/23
17. Berstein Center for Computational Neuroscience Berlin *Elephant Trunk Wrinkle Inspired Robotics and Materials*, Invited Talk to Department, Berlin, Germany - 12/1/22
16. UMass Amherst *A Guide to Forming Collaborative Research Projects*, Neuroscience Graduate Student Speaker Series, Virtual - 10/18/22
15. Northeast Ohio Medical University *The Muscle is not enough: skin driven mechanics of the elephant trunk*, Distinguished Lecture Series, Rootstown, OH - 3/31/22
14. Max Planck Institute for Intelligent Systems *Creating the next generation of bio-inspired materials using the elephant's wrinkled trunk*, Invited Talk, Stuttgart, Germany - 3/22/22
13. Atlanta Locomotion Neuro-mechanics Group *Biomechanics at different scales in the African elephant trunk*, Monthly Invited Talks, Atlanta, GA - 2/25/22
12. Boise State University *Bio-inspiration from the Elephants' Muscular Multi-tool*, Biomechanics Lecture Series, Virtual - 1/27/22
11. Animal Dynamics *Bio-inspiration from the Elephants' Muscular Multi-tool*, Distinguished Lecture Series, Atlanta, GA - 10/27/21
10. Atlanta Science Tavern *Mechanics and Conservation of the African Bush Elephant*, World Elephant Week, Atlanta, GA - 8/23/21
9. The Explorers Club *The Elephant Trunk*, World Elephant Week, 8/10/21
8. Golden Triangle Asian Elephant Foundation *The Muscular Multi-tool: The African Elephant Trunk*, Elephant Expert Talks, Virtual - 7/23/21
7. The Smithsonian Institute, Bio-inspired Design based on the elephant trunk, Summer National Science Foundation Bio-Inspired Design, Virtual - 6/16/21
6. Stemapalooza, *Cross Curricular Research at Zoo Atlanta*, Georgia Science Teachers Association Meeting, Kennesaw, GA - 6/16/21
5. University of Chicago Medical School, *Morphology and Composition of Elephant Trunk Skin and Hair*, Mandible Meeting, Virtual - 3/2/21
4. Atlanta Public Schools, *Bio-Inspired Design in Elephants: From Hair to Trunk to Feet*, Mandible Meeting, 1/18/21 Atlanta, GA - BIRDEE National Science Foundation Teacher Training
3. Pi Tau Sigma, Basic Research Forum, *Using Technology to Save Wildlife from Extinction*, Atlanta, GA - 2/10/21
2. Zoo Atlanta, Quarterly MEGA Group Meetings *Gaining Inspiration from The Elephant Trunk*, Atlanta, GA - 2/15/20
1. Imperial College London, Weekly Seminar Series, *Biomechanics of the African Elephant Trunk*, London, UK - 1/26/20

## **LEADERSHIP AND SERVICE ACTIVITIES**

### **Leadership - External**

- Engineering for One Planet Organizing Team - 2023 - Present

- Postdoc Representative for SICB Division of Comparative Biomechanics - 2022-Present
- Organizing Chair for Southeastern Regional DCB-DVM SICB Conference 2021
- Organizing Chair for Zoo Biomechanics Day - April 2020, April 2023
- Advisory Board Member for Alveus Conservation Organization - 2021 - Present
- Elephant Managers Association Husbandry Committee Member - 2020 - Present

### Leadership - Internal

- Serve-Learn Sustain Faculty Advisor - 2020 - 2022
- Co-Founder of GaTech4Wildlife Student Organization - 2021 - Present
- President of Georgia Tech Mechanical Engineering Graduate Association - 2018 to 2021

### Service - External

- Zoo Atlanta Docent - 2020 - 2022
- Reviewer for Grant Agencies: France National Research Agency Grant Reviewer, ERC Reviewer, National Science Foundation
- Reviewer for Conferences: World Haptics, Living Machines, American Society of Engineering Education
- Reviewer for Journals: IEEE Robotics and Automation Letters, Integrative and Comparative Biology,
- IEEE Robotics and Automation Letters Reviewer, PeerJ, Royal Society Interface, Advanced Materials

### Service - Internal

- Georgia Tech President's Undergraduate Research Award Evaluation Committee - 2020-2021
- Georgia Tech to Teaching Certificate - 2020
- Member of Woodruff School Graduate Research Development Committee - 2018-2020
- Founder of Woodruff School Graduate Mental Health Committee - 2019
- Faculty Learning Community on Incorporating United Nations SDGs into Curriculum - 2021 - 2022

## FEATURED PRESS

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9. Richard Sima, "[The Secret to an Elephant's Trunk is Skin Deep](#)", *New York Times* , (July 18, 2022).
8. Richard Sima, "[Elephant Trunks: Is There Anything They Can't Do?](#)", *New York Times* , (June 1, 2021).
7. Katherine J. Wu, "[One More Reason to Admire Elephant Trunks](#)", *The Atlantic* , (June 1, 2021).
6. Carlyn Kranking, "[Seven Scientific Discoveries From 2022 That May Lead to New Inventions](#)", *Smithsonian Magazine* , (December 28, 2022).
5. Jessica Hallett, "[Elephants' trunks are mighty suction machines](#)", *Nature* , (June 1, 2021).
4. Ze Frank, "[True Facts: Elephants](#)", *True Facts YouTube Channel* , (July 27, 2021).
3. Chris Packham, Megan McCubbin, "[An elephant's secret weapon...](#)", *BBC Earth - Amaze Me with Chris & Megs* , (July 27, 2021).

2. Ari Shapiro, Mary Louise Kelly, [“The Secret To Better Soft-Bodied Robots Might Be Found in Elephant Trunks”](#), *NPR - All Things Considered* , (June 8, 2021).
1. Anne Cissel, [“Elephants Roaming with the Herd”](#), *Ranger Rick* , (March 1, 2022).

*@ Max Planck Institute for Intelligent Systems, Haptic Intelligence Department*