HARRISON SIMS

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First-year Ph.D. student at the University of Michigan with a robust foundation in psychology, biomedical engineering, and mathematics working to advance research in human-machine networks and teamness.

Education

Bachelor's Degree: Biomedical Engineering (BS) and Psychology (BA), Johns Hopkins University: 3.94 GPA, BMES President, Blue Key Society**,** Alpha Phi Omega Service Fraternity

Graduation With Honors: May 2024
Honors Societies: Tau Beta Pi (Engineering), Psi Chi (Psychology), Alpha Eta Mu Beta (Biomedical Engineering)

Relevant Classes: Systems and Controls, Nonlinear Dynamics, Industrial and Organizational Psychology, Probability, Occupational Health Psychology, Advanced Statistical Methods, Applied Statistics/Data Analysis, Monte Carlo Methods, Stochastic Processes, Design Team Health-Tech Project, Discrete Event Simulation, Work Measurement, Human Error & Complex System Failure, Global Cultural Systems Engineering, Interprofessional Perspectives in Occupational Health and Safety

Honors and Awards:

NSF Graduate Student Research Fellowships Program (GRFP) Honorable Mention (1 of 8 nationally) ~ 2025
Hispanic Scholarship Fund Scholar ~ 2020–2024
Rackham Graduate Student Research Grant ~ 2024
Achievement Rewards for College Scientists Scholar Awardee (ARCS) ~ 2023

Publications:

Sims, H., Neyens, D., Catchpole, K., Biro, J., Lusk, C., & Abernathy III, J. (2024). The Impact of a Novel Syringe Organizational Hub on Operating Room Workflow During a Surgical Case. *Joint Commission Journal on Quality and Patient Safety*.

Sims, H., Biro, J., Lusk, C., Neyens, D. M., Catchpole, K., Shaik, A. S., ... & Abernathy III, J. H. (2023). The design and evaluation of a syringe hub for organizing syringes in anesthesia medication delivery. *Human Factors in Healthcare, 4* 100049.

Presentations:

Sims, H., (2025). The Development of a Novel Resilience Scorecard: What We Can Learn from Supply Chain Logistics. International Symposium on Human Factors and Ergonomics in Healthcare, March 30- April 2, 2025. Toronto, ON

Sims, H., Rosen, M., & Koka, R. (2024). Building the Connection Between Human Factors Analysis and Practical Application: A Case Study On The Complexities Anesthesia Scheduling. International Symposium on Human Factors and Ergonomics in Healthcare, March 24-27, 2024. Chicago, IL

Sims, H., Biro, J., Shaik, A., Rastogi, S., Neyens, D. M., Abernathy III, J.H., Catchpole, K.R., Lusk, C., & Woodward, J. (2023). The Perceptions of a Novel Syringe Organizational Device Following Implementation and its Impact on Operating Room Workflow During a Surgical Case. International Symposium on Human Factors and Ergonomics in Healthcare, March 26-29, 2023. Orlando, FL

Woodward, J., Catchpole, K.R., Neyens, D. M., **Sims, H.**, Biro, J., Segarra, G., Lusk, C., & Abernathy III, J.H. (2023). Creation of a SEIPS 101 Tasks and Tools Matrix on Anesthesia Medication Delivery. International Symposium on Human Factors and Ergonomics in Healthcare, March 26-29, 2023. Orlando, FL

Biro, J., Abernathy III, J.H, Catchpole, K.R., Lusk, C., Munie, S., Neyens, D.M., **Sims, H.**, & Wang, C. (2022). Technology acceptance across systems and roles: A survey of anesthesia providers evaluating a device designed to improve syringe organization during a surgical case. International Symposium on Human Factors and Ergonomics in

Healthcare, March 26-29, 2022. New Orleans, LA

Technical Skills

Human Factors Tools: TAM, CTA, HTA, FRAM
Code: Python, MATLAB, Java, C++, R, Javascript
3D Printers: Makerbot, Stratasys, Ultimaker
Machine Learning: CLIP, BERT, BLIP, spaCy, Hugging Face Transformers, embedding analysis
Development: HTML, CSS, Django, Flask, Shiny Apps
UX: Redcap, Zendesk, Figma, Qualtrics, Wireframes
CAD: Solidworks (CSWP), Onshape, Autodesk
Simulation: MCMC, Bootstrap, Kalman Filtering, DES
R Packages: lme4, ggplot2, tidyverse, psych

Work Experience

Intern Scientist, May 2025-August 2025 ~ **Aptima Inc.**, Woburn, MA

● Conducted advanced statistical analyses for DARPA-funded projects, applying ANOVA and linear mixed-effects models in R to extract key findings and generate visualizations.

● Performed a state-of-the-art literature review on evaluation methodologies for multimodal content generation—including text, images, videos, and time series—synthesizing findings to guide project design.

● Designed and implemented a modular Python-based evaluation pipeline for multimodal AI generation, integrating BLIP, CLIP, BERT, spaCy, and embedding similarity analysis to assess coherence, creativity, and consistency.

● Generated a synthetic image dataset with Kandinsky to support evaluation tasks and future research applications.

● Authored research abstracts, reports, and documentation to communicate results and ensure continuity of developed methods and tools.

Research Assistant, May 2024-August 2024 ~ **University of Michigan**, Ann Arbor, MI

● Conducted an in-depth literature review on human-human and human-robot team dynamics, systematically analyzing 50+ peer-reviewed articles to establish the theoretical foundation for doctoral research.

● Produced detailed research notes and synthesized key findings into monthly presentations for faculty advisor, guiding the refinement of dissertation research questions.

● Engaged in professional development through National Academies of Sciences, Engineering, and Medicine webinars on AI development and responsible oversight, integrating broader perspectives into research framing.

Human Factors Researcher, August 2022-May 2024 ~ **Armstrong Institute of Patient Safety**, Baltimore, MD

● Conducted research on the construction of anesthesia teams, specifically researching optimized schedule development.

● Designed an interview protocol, developed an interview script based on the functional resonance analysis method, and conducted several in-depth interviews to better understand the cognitive complexities of schedule development.

● Wrote an IRB application for sensitive data acquisition and technology acceptance research in the medical setting.

● Developed and analyzed a model of the scheduling workflow using the functional resonance analysis method (FRAM).

● The results of the FRAM were then used by a collaborating research team to inform the development of an optimization algorithm.

Human Factors Researcher, May 2021-August 2023 ~ **Johns Hopkins Hospital**, Baltimore, MD

● Conducted patient safety research for a multi-institutional and multi-disciplinary AHRQ-funded research team.

● Reviewed team projects, developed protocols for IRB approval, led the Johns Hopkins research team, authored two academic research papers (one under review), and presented monthly research updates at collaborator meetings.

● Developed prototypes of implementable devices using Solidworks, conducted usability studies with the technology acceptance model, performed cognitive task analysis, and conducted statistical analysis using multivariate regression.

● Observed over 20 full-length cardiac anesthesia cases in the process of data collection and conducted several in-depth interviews with clinicians using a self-created interview script and interview protocol.

● Designed, managed, and reported an observational study to evaluate the impact of novel interventions in the operating room. Managed the study from start to finish, working with collaborators, instructing a research team, and analyzing data.

UX Research and Design Intern, June 2022-August 2022, June 2023-August 2023. ~ **PTC Inc. (Onshape)**, Boston, MA

● Designed, prototyped, tested, and implemented new functionality for Onshape software using Figma to create prototypes and conducting UX tests to gather user-centered feedback. Prototyping included icon development, workflow creation, webpage redesign, and novel feature ideation and implementation.

● Created a fully functional web application using the Django Python web development framework. Wrote in Python for backend development, and HTML, CSS, and Bootstrap for frontend development.

● Used Python to build a scanning tool for the reading of published ISO standards using Tesseract for optical character recognition and the Pandas package for data frame manipulation and modification.

● Worked with the customer service team using the software I developed to address customer complaints through Zendesk, and worked with developers to integrate the software I developed into the product.

———————————————*Teaching Experience*———————————————

Teacher's Assistant, January 2022-December 2023~ **Johns Hopkins University**, Baltimore, MD

● Served as a teaching assistant for Computational Cardiology, Biomedical Data Science, and four semesters of Introduction to Business. Student evaluation methods included quizzes, exams, and written reports.

● Collaborated with the course professors to create evaluation material that appropriately covered content.

● Organized review sessions, provided continued feedback on semester-long projects, and appropriately addressed situations of academic dishonesty and failing performance with the goal of success and learning for all enrolled students.

● Developed a learning environment where students reported feeling supported. With me as the TA, the courses received above-average mid-year scores on a student survey, and all students passed the classes.

First Year Mentor, August 2021-May 2024 ~ **Johns Hopkins University**, Baltimore, MD

● Served as a mentor for incoming students with the goal of helping mentees transition smoothly into college. This year-long position involved orienting my mentees to campus and providing support.

● Helped new students become acclimated to their new life on a college campus and develop community.

● Guided students around campus and provided critical information about campus life, emotional support, and mentorship as the semester progressed; organized a variety of group bonding events to enhance a sense of belonging.

● Mentored students to become academically successful, deeply engaged with campus activities, and confident on campus.

———————————*Community Engagement / Volunteer Work*———————————

Student Representative, February 2025-Present ~ **HFES Occupational Ergonomics Technical Group**

● Actively serving as the student representative on the HFES Occupational Ergonomics Technical Group leadership committee with the goal of providing unique insights from a student's perspective.

● Collaborating closely with the other members of the technical group leadership committee to review conference submissions and promote the research of our technical group members on social media.

● Working to plan a professional development event for students and young professionals meant to highlight the diverse career opportunities and academic backgrounds in occupational ergonomics.

President, September 2020-May 2024 ~ **Johns Hopkins University BMES**, Baltimore, MD

● Served as the president of the Johns Hopkins Biomedical Engineering Society with the goals of developing coherent marketing messaging, offering more social and professional events, and creating better community engagement.

● Managed the social media accounts for the Biomedical Engineering Society, created and managed the new LinkedIn, oversaw the development of the official BMES website, and worked to curate an official Johns Hopkins BMES brand.

● Worked closely with other board members to revitalize the community outreach program. We are now partnered with public schools and afterschool programs to provide instructional sessions about engineering and STEM as a whole.

● The Johns Hopkins BMES has become a well-known student organization with an over 500% increase in membership and an over 100% increase in event attendance.

● Johns Hopkins BMES is now well-connected within the Baltimore community and well-positioned to further its community engagement.

Diversity Admissions Assistant, March 2021-May 2024 ~ **Johns Hopkins University Admissions**, Baltimore, MD

● Volunteered within the Johns Hopkins University admissions office to improve educational equity

● Worked closely with admissions officers to run tours and host prospective student discussions.

● In a year-long paid position with the Access and Diversity committee (2021-2022), worked tirelessly to improve access to university support systems and resources for prospective students from underrepresented backgrounds.

● In the admissions office, I focused on improving educational equity, and I have had personal conversations with people from many backgrounds providing a personal perspective on higher education admissions processes and attending Johns Hopkins University

Academic Tutor, September 2022-May 2024 ~ **SquashWise**, Baltimore, MD

● Volunteered as an academic tutor for SquashWise, a Baltimore nonprofit after-school program where local students can get help with their school work while also playing on an elite squash team.

● Tutored a mixture of high school and middle school students, focusing on mathematics and history.

● Worked closely with low-income high school students to successfully apply to top-rated public and private universities while securing valuable scholarships and applying for need-based financial aid.

● Developed rewarding relationships with all of the students and helped many of my tutees get into their dream schools while also finding the scholarship money to be financially secure.