Valerie Rennoll

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Professional Profile

- Expertise in developing and characterizing technologies that improve disease detection through body sound monitoring
- Detail-oriented & reliable team player with track record for solving problems & completing multiple tasks in fast-paced environments
- Broad range of technical & interpersonal competencies that have resulted in peer-reviewed publications, patents, grants, & awards
- Experiences planning statistically grounded experiments, analyzing scientific data, characterizing materials, & developing acoustic technologies
- Dedicated to increasing diversity in STEM fields by actively organizing mentoring & outreach opportunities

Education

Johns Hopkins University (JHU) - Baltimore, MD

2016 - Present

Ph.D. Electrical and Computer Engineering (Dr. James West laboratory), expected graduation April 2023

American University (AU) - Washington, DC

2012 - 2016

Bachelor of Science in Audio Technology and Physics with Honors

Skills

Programming languages	Matlab, Mathematica, Python, R, Arduino, LaTeX, Java
Software	JMP, Minitab, SolidWorks, Pro Tools, Logic Pro, Microsoft Office
Material fabrication & characterization	Electrospinning, corona charging, SEM, XRD, FTIR, electrostatic voltmeter
Design	Illustrator, Procreate
Other	Design of experiments, time management, technical writing

Relevant Experiences

Doctoral Researcher

July 2016 - Present

Johns Hopkins University - Baltimore, MD

- Optimize electret polymers & flexible electronics for use in flexible, acoustic impedance-matched transducers to improve sound capture from the human body, musical instruments, & underwater
- Generate statistical model that determines the fabrication conditions for a polymer to demonstrate specific acoustic properties
- Design an acoustic phantom for improved characterizations and comparisions of body sound monitoring technology
- Develop signal processing methods to manipulate the perceptual characteristics of electronic stethoscopes
- Characterize the frequency response, reliability, & power output of transducers using various equipment, such as simulators & shakers
- Investigate how biomolecules can be used to enhance the electrical response of polymers
- Communicate technical results to wide audiences via written documents and oral presentations through the preparation of multiple conference presentations, grants, patents, & publications
- Supervise 5 graduate, undergraduate, & high school students completing independent laboratory research projects

Research Intern

May 2022 - August 2022

Sonavi Labs - Baltimore, MD

- Prepared 12-page grant proposal on developing and characterizing new wearable body sound monitoring device
- Collected and analyzed pulse oximeter, electrocardiogram, and stethoscope data to assess viability for including in wearable device

Lab Technician

Apr. 2020 - May 2020

Dipole Materials - Baltimore, MD

- Produced electrospun nanofiber face mask filters for distribution to local hospitals and online retailers during the COVID-19 pandemic
- Developed preliminary formulation of material & solvent combination for robust fiber formation
- Performed quality control checking of filter material & corrected for instrument complications

Acoustic Consultant Intern

Sep. 2015 - Dec. 2015

Shen Milsom & Wilke - Washington, DC

- Composed reports for 5 clients addressing potential acoustic issues & how to mitigate architectural impacts
- Conducted site visits at the National Institutes of Health & National Museum of African American History & Culture to collect acoustic data for the installation of a microscope and construction of a concert hall

Research Intern

May 2015 - Aug. 2015

NOAA Office of Coast Survey - Silver Spring, MD

- Analyzed approximately 2 terabytes of acoustical depth data for ocean floor mapping in the Arctic
- Created new workflow for the Office of Coast Survey to ingest bathymetric data from outside sources
- Utilized sonar for acoustic data collection onboard NOAA Ship *Fairweather*

Undergraduate Researcher

Aug. 2014 - May 2016

American University - Washington, DC

- Measured thermal noise in optical coatings for use in the Laser Interferometer Gravitational-Wave Observatory
- Constructed demonstrations to explain acoustics concepts, such as interference between and diffraction of waves
- Applied delay-sum beamforming to Playstation Kinect and handmade microphone array

Research Intern

June 2014 - Aug. 2014

Applied Research in Acoustics - Culpeper, VA

- Performed subject matter expert playtesting of WaveQuest, an educational underwater acoustics video game
- Developed parametric underwater noise models as part of real-time passive sonar simulation engine
- Literature review & model documentation for inclusion in governmental report

Teaching Experience

Adjunct Lecturer - Peabody Institute

Aug. 2021 - Dec. 2021

Designed & led an introductory, graduate-level musical acoustics course for 12 students with semester-long research project to characterize impedance-matched acoustic sensor for musical applications

Course Instructor - JHU

Aug. 2020 - Dec. 2020

Developed an introductory course on electret materials for 6 freshman undergraduates with demonstrations on energy harvesting & microphone design

Guest Lecturer - JHU

Spring 2020

Developed and provided guest lectures on the electronic properties of materials for a graduate level course

Teaching Academy Participant - JHU

Aug. 2019 - Dec. 2020

Completed certificate program that provided formal instruction on pedagogy and evidence-based teaching practices

Physics Teaching Assistant - AU

Jan. 2013 - May 2016

Held regular office hours to support students in understanding class content and assessed weekly homework assignments of approximately fifty students

Publications

Available via Google Scholar Profile.

McLane, I., **Rennoll, V.**, Elhilali, M., West, J. "Body sound monitoring with acoustic impedance-matched sensor." In preparation for submission spring 2023.

Rennoll, V., McLane, I., Eisape, A., Grant, D., Elhilali, M., West, J. "Design of an electrostatic transducer with acoustic impedance matching through an optimal design of experiments." In preparation for submission spring 2023.

Grant, D., McLane, I., **Rennoll, V.**, West, J. "Considerations and challenges for real-world deployment of an acoustic-based COVID-19 screening system." Sensors, 2022, 22, 9530.

Rennoll, V., McLane, I., Elhilali, M., West, J. "Optimized acoustic phantom design for characterizing body sound sensors." Sensors, 2022, 22, 9086.

Rennoll, V., et al. "Project-based learning through sensor characterization in a musical acoustics course." The Journal of the Acoustical Society of America, 2022, 152, 1932-1941.

Eisape, A., **Rennoll, V.**, Volkenbug, T.V., Xia, Z., West, J., Kang, S.H. "Soft CNT-Polymer Composites for High Pressure Sensors." Sensors, 2022, 22, 5268.

Rennoll, V., Lee, S., Erturun, U., Fried, S., West, J. "DNA increases the β–phase content of PVDF films." 2020 IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP), 2020, 431-434.

Rennoll, V., McLane, I., Emmanouilidou, D., West, J., Elhilali, M. "Electronic stethoscope filtering mimics the perceived sound characteristics of acoustic stethoscope." IEEE Journal of Biomedical and Health Informatics, 2021, 25(5), 1542-1549.

Fischl, K.D., Tognetti, G., Mendat, D., Orchard, G., Rattray, J., Sapsanis, C., Campbell, L., Elphage, L., Niebur, T., Pasciaroni, A., **Rennoll, V.**, Romney, H., Walker, S., Pouliquen, P., Andreou, A. "Neuromorphic self-driving robot with retinomorphic vision and spike-based processing/closed-loop control." 2017 51st Annual Conference on Information Sciences and Systems (CISS), 2017, 1-6.

Patents

Grant, D., McLane, I., **Rennoll, V.**, West, J. Systems and methods for acoustic-based diagnosis. Provisional patent 63/416,298.

Rennoll, V., McLane, I., Eisape, A., Elhilali, M., West, J. Impedance-matched acoustic transducer, PCT/US2021/054088.

McLane, I., West, J., Emmanouilidou, D., Elhilali, M., **Rennoll, V.**, Erturun, U., Orrego, S., Kang, SH. Tunable thin- film acoustic sensor, manufacturing methods, and processing algorithms, Filed JHU Invention Disclosure, D14834, July 7, 2017.

Presentations

ASA Acoustics in Focus *virtual; June 2021*

Evaluating the impact of acoustic impedance matching on the airborne noise rejection and sensitivity of an electrostatic transducer

Acoustics Virtually Everywhere *virtual; Dec. 2020*

Characterizing the acoustic impedance and attenuation of biocompatible elastomers: an optimal design of experiments approach

CEIDP *virtual; Oct. 2020*

DNA increases the β–phase content of PVDF films

MRS Fall Meeting *Boston, MA; Dec. 2019*

Assessing the individual contributions of dipolar, trapped, and triboelectric charges to electrospun PVDF's electrical response

Posters

JMP Discovery Summit *virtual; Oct. 2021*

Design of experiments to characterize and predict polymer acoustic properties

Johns Hopkins Dept. of Medicine & Whiting School of Engineering Research Retreat *virtual; Mar. 2021*

Electrostatic transducer with tuned mechanical properties for improved body sound sensing

APS March Meeting *Baltimore, MD; Mar. 2016*

Visualizing Sound: Demonstrations to Teach Acoustic Concepts

Ocean Sciences Meeting *New Orleans, LA; Feb. 2016*

Data Mining to Chart the Arctic: Analysis of Approaches to Incorporate Outside Source Data into NOAA Office of Coast Survey Workflow

Honors

Johns Hopkins University Electrical and Computer Engineering Community Builder Award	*May 2022*
Acoustical Society of America, DC Chapter, Oral Presentation Award	*May 2021*
Collegiate Inventors Competition Runner Up Award	*Oct. 2020*
Maryland State Three Minute Thesis Competition, Audience's Choice	*May 2019*
Johns Hopkins University Three Minute Thesis Competition, 2nd Place	*Apr. 2019*
Phi Beta Kappa Member	*Spring 2016*
Outstanding Academics in Audio Technology, American University	*Spring 2014-2016*
Honors and Scholars Program Outstanding Senior, American University	*Spring 2016*
Outstanding Physics Academics, American University	*Spring 2013-2014, 2016*
Honors Capstone Research Grant, American University	*Fall 2015*
Acoustical Society of America, DC Chapter, Oral Presentation Award	*May 2015*
Barry Goldwater Scholarship Honorable Mention	*Spring 2015*
Honors Scholars and Artists Award, American University	*Spring 2015*
Physics Teaching Assistant Award, American University	*Spring 2015*
NOAA Hollings Scholar	*2014-2016*
Dean's List, American University	*2012-2016*
Dean's Scholarship, American University	*2012-2016*
Girl Scout Gold Award	*2012*

Grants

Johns Hopkins University Discovery Award *June 2022*
Contact Sensor Design and Processing for Improved Perceptual Sound Pickup of the Double Bass

IEEE Dielectrics & Electrical Insulation Society Graduate Student Fellowship *Dec. 2019*
Nucleic Acid - Polymer Hybrid Materials for Biocompatible Piezoelectric Devices

Johns Hopkins University Discovery Award *July 2019*
Creating Biomolecule-Polymer Hybrid Materials for Biocompatible Piezoelectric Devices

Leadership

Revision, Editor - JHU *May 2021 - Present*
Edit 1 document every 2 months, including manuscripts, grant applications, & personal statements, for clarity, grammar, & content

Electrical & Computer Engineering Graduate Student Association, President - JHU *Sept. 2021 - July 2022*
Led & organized at least 1 event per month, including lunch & learns, outreach opportunities, & study breaks, to build graduate community

Womxn Mentoring Whiting, Mentor - JHU *Jan. 2021 - June 2022*
Mentored undergraduate engineering students to provide support with internship & graduate school applications

STEM Achievement in Baltimore Elementary Schools, Mentor - JHU *Fall 2019*
Assisted students in completing student-driven STEM projects during afterschool program

Expanding Your Horizons: STEM Discovery Day, Volunteer - Stevenson University *Sept. 2017 - 2019*
Designed & led workshops introducing roughly 100 participants to the science of sound & construction of a speaker

Southern Elementary School Science Friday, Organizer - Glen Rock, PA *Apr. 2018*
Co-organized event & coordinated over 20 volunteers to introduce elementary students to STEM fields

Expanding Your Horizons: STEM Discovery Day, Activity Leader - Stevenson University *Sept. 2017-2019*
Designed and led workshops introducing participants to the science of sound and construction of a speaker

Girl Scout GENIUS Day, Organizer - New Freedom, PA *Apr. 2017*
Co-organized event to introduce 130 girls to variety of STEM fields through hands-on workshops

Women in Science, President - AU *June 2015*
Coordinated & led multiple events including a Girl Scout outreach day, Professor Potluck, Fall Social, Alumni Panel, & luncheon with Associate Director for Science at the White House

Sound Foundation, Intern - Culpeper, VA *June 2014 - Aug. 2014*
Gathered research to form case of support for the nonprofit, which introduces disadvantaged high school students to STEM & business fields through real-world acoustics projects

Search Committee, Student Representative - AU *Fall 2015*
Interviewed potential candidates and provided feedback on potential audio technology professors

National Maker Faire, Volunteer - Washington, DC *June 2015*
Showed and explained audio spectrum analyzer project to the public at American University's booth

USA Science and Engineering Festival, Volunteer - Washington, DC *Apr. 2014 & 2016*
Interacted with the public to explain the science of sports and sound at American University's booth