


Scott Schoen Jr

He/Him/His

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Education

- 2016–2020 **Georgia Institute of Technology Atlanta, GA**
PhD Mechanical Engineering (Acoustics, Mathematics)
Thesis: *Trans-skull Ultrasound for Imaging and Therapy*
Supervisor: Costas D. Arvanitis
- 2011–2013 **The University of Texas at Austin Austin, TX**
MSE Mechanical Engineering (Acoustics)
Thesis: *Acoustic Characterization of Encapsulated Microbubbles at Seismic Frequencies*
Supervisor: Mark F. Hamilton
- 2007–2011 **Tufts University Medford, MA**
BS (magna cum laude) Physics & Music

Research Experience

- 2023–pres. **Instructor in Radiology**
- 2021–2023 **Postdoctoral Fellow** *Harvard Medical School & Massachusetts General Hospital Center for Ultrasound Research & Translation*
Leveraging fundamental acoustics, signal processing, and machine learning techniques to improve diagnostic ultrasound images, with particular emphasis on aberration correction and contrast-enhanced techniques.
- 2016–2021 **Graduate Research Assistant** *Georgia Institute of Technology Ultrasound Biophysics & Bioengineering Lab*
Developing fast algorithms to account for the acoustic heterogeneity of skull bone, and techniques to improve resolution and exploit nonlinearity.
- 2013–2016 **Research Associate** *Trident Research LLC*
Member of team responsible for maintenance and refresh of mandatory impact localization system used during US Navy flight test operations.
 - Planned collection of and analyzed acoustic & GPS data to produce final impact scores
 - Created computational models of communications reliability, satellite network availability, and ocean acoustic propagation to aid sensor deployment
 - Served as cybersecurity manager for system IT components
- 2011–2013 **Graduate Research Assistant** *The University of Texas at Austin Applied Research Laboratories*
Investigating the feasibility of the use of encapsulated microbubbles as low-frequency (sub-resonance) acoustic contrast agents for applications in seismic imaging.
- 2009–2011 **Undergraduate Research Assistant** *Tufts University*
Investigating the crystallization behavior of polymers in the presence of multiwalled carbon nanotubes.

Service

Journal Referee

Ultrasonic Imaging (Associate Editor)

Frontiers in Acoustics (Review Editor)

Proceedings of Meetings on Acoustics (Associate Editor, Biomedical Acoustics)

AD HOC: *IEEE T. Med. Imag.* – *IEEE T. Ultrason. Ferroelec.* – *Ultrasound Med. Biol.* – *Int.*

J. Comput. Assist. Radiol. Surg. – *J. Acoust. Soc. Am.* – *JASA-EL*

Committee Member RSNA QIBA rsna.org

Member of Pulse-Echo Quantitative Ultrasound (PEQUS) committee

Harvard University Bioengineering seas.harvard.edu

Senior Thesis Supervisor for James R. Young (2021–2022)

Thesis: SoundAI: Machine Learning-Based Correction of Ultrasound Aberration

ASA Georgia Tech Student Chapter gt-asa.org

Vice President (2019), President (2018), Treasurer (2017)

IEEE-UFFC Georgia Tech Student Chapter ieee-uffc.org

Treasurer (2019–2020)

Professional Affiliations

2012–13
2016–pres.

Acoustical Society of America acousticalsociety.org

2018–pres.

IEEE Ultrasonics Ferroelectrics and Frequency Control Society ieee-uffc.org

2021–pres.

American Institute of Ultrasound in Medicine aium.org

2020–2021

American Association of Physicists in Medicine aapm.org

2018–2020

Biomedical Engineering Society bmes.org

2018–2020

International Society for Therapeutic Ultrasound istu.org

Awards & Achievements

ASA Early Career Travel Award, ASA Sydney (2023)

FV Hunt Postdoctoral Research Fellowship in Acoustics (2022–2023)

Overall Runner-up, ULTRA-SR Challenge at IEEE IUS (2022)

NCAC Travel Award, ASA 179 (2020) & ASA 177 (2019)

2nd Place, ASA International Student Challenge Problem (2019)

ASA Travel Subsidy, ASA 178 (2019)

Provost's Award, CRIDIC Poster Competition (2019)

Session co-moderator & Student Travel Award, ISTU'18 Nashville, TN USA (2018)

Elizabeth & Russell Hallberg Foundation Fellowship in Engineering Acoustics (2011)

Tufts University Dean's List (2007–2011)

Languages

English (native), Spanish (proficient)

Publications

Journal Articles

1. **Schoen Jr, S. J.**, Arshad, S., Prasov, A., Candel, I., Ottensmeyer, M., Brattain, L., Telfer, B. & Samir, A. E. Microbubble Contrast Agents Improve Detection of Active Hemorrhage. *Under Review* (2024).
2. **Schoen Jr, S. J.** & Samir, A. E. Spectral Aberration Correction with Machine Learning Medium Inference. *In Preparation* (2024).
3. Lerendegui, M., Riemer, K., George, P., Lachlan, A. J. M., Wang, B., Chavignon, A., Ashikuzzaman, M., Couture, O., *et al.* ULTRA-SR: assessment of Ultrasound Localisation and Tracking Algorithms for Super Resolution Imaging. *Under Review* (2023).
4. **Schoen Jr, S. J.**, Kumar, V., Gu, Y., Dayavansha, S. K., Tadross, R., Thomenius, K., Washburn, M. & Samir, A. E. Efficient Aberration Correction via Optimal Bulk Speed of Sound Compensation. *Under Review* (2023).
5. Zhang, L., Marcus, C., Mejorado, D., **Schoen Jr, S. J.**, Pierce, T. T., Kumar, V., Fernandez, S. V., Hunt, D., *et al.* Conformable Phased Array Ultrasound Patch for Bladder Volume Monitoring. *Nature Electronics* (2023).
6. Ozturk, A., Pierce, T. T., Li, Q., Baikpour, M., Rosado-Mendez, I., Wang, M. H., **Schoen Jr, S. J.**, Gu Yuyang and Dayavansha, S. K., *et al.* The Future is Beyond Bright: The Evolving Role of Ultrasound for Liver Disease. *Radiology* **309** (Nov. 2023).
7. Wang, X., Bamber, J. C., Esquivel-Sirvent, R., Ormachea, J., Sidhu, P. S., Thomenius, K. E., **Schoen Jr, S.**, Rosenzeig, S., *et al.* Ultrasonic Sound Speed Estimation for Liver Fat Quantification: A Review by the AIUM-RSNA QIBA Pulse-Echo Quantitative Ultrasound Initiative. *Ultrasound in Medicine and Biology* **49**, 2327–2335 (Nov. 2023).
8. Gu, Y., Kumar, V., Dayavansha, S. K., **Schoen Jr, S. J.**, Tadross, R., Thomenius, K., Washburn, M. & Samir, A. E. Propagation-invariant acoustic beams for adaptable shear wave imaging. *Science Advances* **9** (Nov. 2023).
9. Song, Z., Wang, S., Li, Q., Ozturk, A., Mittal, V., **Schoen Jr, S. J.**, Ramaswamy, S., Pierce, T. T., *et al.* Memory-efficient low-compute segmentation algorithms for edge ultrasound devices: continuous bladder monitoring. *Scientific Reports* **13** (Sept. 2023).
10. **Schoen Jr, S. J.**, Kilnic, M. S., Lee, H., Guo, Y., Degertekin, F. L., Woodworth, G. F. & Arvanitis, C. D. Towards controlled drug delivery in brain tumors with microbubble-enhanced focused ultrasound. *Advanced Drug Delivery Reviews* **180** (2022).
11. **Schoen Jr, S. J.**, Dash, P. P. & Arvanitis, C. D. Experimental Demonstration of Trans-skull Volumetric Passive Acoustic Mapping with the Heterogeneous Angular Spectrum Approach. *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* **69**, 534–542 (2022).
12. Lee, H., Guo, Y., Ross, J. L., **Schoen Jr, S. J.**, Degertekin, F. L. & Arvanitis, C. D. Spatially targeted brain cancer immunotherapy with closed loop controlled focused ultrasound and immune checkpoint blockade. *Science Advances* **8** (2022).
13. **Schoen Jr, S. J.**, Zhao, Z., Huang, C., Chen, S. & Arvanitis, C. D. Morphological Reconstruction Improves Microvessel Mapping and Characterization in Super-Resolution Ultrasound. *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* **68**, 2141–2149 (2021).
14. **Schoen Jr, S. J.** & Arvanitis, C. D. Acoustic source localization with the angular spectrum approach in continuously stratified media. *The Journal of the Acoustical Society of America* **148**, EL333–EL339 (2020).
15. **Schoen Jr, S. J.** & Arvanitis, C. D. Heterogeneous Angular Spectrum Method for Trans-skull Imaging and Focusing. *IEEE Transactions on Medical Imaging* **39**, 1605–1614 (2020).

16. Patel, A., **Schoen Jr, S. J.** & Arvanitis, C. D. Closed Loop Spatial and Temporal Control of Cavitation Activity with Passive Acoustic Mapping. *IEEE Transactions on Biomedical Engineering* **66**, 2022–2031. ISSN: 0018-9294 (July 2019).

Invited Talks

1. **Schoen Jr, S. J.** *Diagnostic Ultrasound in the Liver: Challenges and Opportunities in Joint GT-ASA and IEEE IUS Student Chapter Seminar* (Oct. 2023).
2. **Schoen Jr, S. J.** *Ultrasound through the Skull: Seeing and Treating Noninvasively in University of Texas at Austin Acoustics Seminar* (Virtual, Nov. 2021).
3. **Schoen Jr, S. J.** *Towards Efficient Methods for Transcranial Ultrasound Monitoring & Control in 2020 Joint AAPM | Comp Meeting* (Virtual, July 2020).

Theses

1. **Schoen Jr, S. J.** *Trans-skull Ultrasound for Imaging and Therapy* PhD Dissertation (Georgia Institute of Technology, Dec. 2020).
2. **Schoen Jr, S. J.** *Acoustic characterization of encapsulated microbubbles at seismic frequencies* MS Thesis (The University of Texas at Austin, Dec. 2013).

Patent

1. Arvanitis, C. D., Patel, A., **Schoen Jr, S. J.** & Zhao, Z. *Systems and Methods for Ultrasound Imaging and Focusing* US Patent Pending PCT/US2019/060217. Nov. 2019.

Conference Presentations

1. **Schoen Jr, S. J.**, Tehrani, A. K. Z. & Samir, A. E. *Deep Learning–Based Microbubble Localization towards Improved Super-resolution Ultrasound* in *Journal of the Acoustical Society of America* (Sydney, Australia, Dec. 2023).
2. Pierce, T. T., Ottensmeyer, M., Som, A., Brattain, L., Weblin, J. S., Sutphin, P. D., **Schoen Jr, S. J.**, Johnson, M. R., et al. *Individualized Ultrasound-Guided Intervention Phantom Development, Fabrication, and Proof of Concept* in *IEEE Engineering in Medicine and Biology Conference* (Sydney, Australia, July 2023).
3. Telfer, B., **Schoen Jr, S.**, Candel, I., Arshad, S., Ottensmeyer, M., Brattain, L. & Samir, A. E. *Contrast-Enhanced Ultrasound To Detect Active Bleeding* in *IEEE Engineering in Medicine and Biology Society* (Sydney, NSW Australia, July 2023).
4. **Schoen Jr, S. J.**, Jakovljevic, M. & Samir, A. E. *Plane Wave Imaging in Arbitrary Media via Efficient Phase Compensation* in *International Symposium on Ultrasound Imaging and Tissue Characterization* (Arlington, VA, June 2023).
5. **Schoen Jr, S. J.** & Samir, A. E. *Fast Spectral Approach for Delay Correction in Heterogeneous Media* in *Journal of the Acoustical Society of America* (Chicago, IL, May 2023).
6. Lee, H., Guo, Y., Ross, J. L., **Schoen Jr, S. J.**, Degertekin, F. L. & Arvanitis, C. D. *Spatially targeted immunotherapy in glioma with closed-loop microbubble enhanced focused ultrasound control* in *International Society for Therapeutic Ultrasound* (Lyon, France, Apr. 2023).
7. **Schoen Jr, S. J.**, Kumar, V., Brattain, L., Telfer, B. & Samir, A. E. *Contrast-enhanced ultrasound to detect active bleeding* in *Journal of the Acoustical Society of America* (Nashville, TN, Dec. 2022).
8. **Schoen Jr, S. J.**, Kumar, V., Gu, Y., Dayavansha, S. K., Tadross, R., Thomenius, K., Washburn, M. & Samir, A. E. *Optimal Abdominal Imaging with Bulk Speed of Sound Beamforming* in *2022 IEEE International Ultrasonics Symposium* (Venice, Italy, Oct. 2022).
9. **Schoen Jr, S. J.**, Samir, A. E. & Kumar, V. *MR for ULTRA-SR: Improved Localization with Morphological Image Processing* in *2022 IEEE International Ultrasonics Symposium* (Venice, Italy, Oct. 2022).

10. Young, J. R., **Schoen Jr, S. J.**, Kumar, V. & Samir, A. E. *SoundAI: Aberration Correction from Learned Sound Speed Maps in 2022 IEEE International Ultrasonics Symposium* (Venice, Italy, Oct. 2022).
11. **Schoen Jr, S.**, Heidari, F., Parameswaran, M., Cheah, E., Ozturk, A., Martin, M., Kumar, V., Pierce, T. T., et al. *Accurate Fibrosis Staging from Unstructured Data with Natural Language Processing in American Institute of Ultrasound in Medicine* (San Diego, CA, Mar. 2022).
12. Dash, P. P., **Schoen Jr, S. J.** & Arvanitis, C. D. *Experimental Demonstration of 3D Transcranial Passive Acoustic Mapping with the Heterogeneous Angular Spectrum Approach in 2021 IEEE International Ultrasonics Symposium* (Xi'an, China, Sept. 2021).
13. Lee, H., Schoen Jr, S., **Guo, Y.**, Kim, C., Degertekin, F. L. & Arvanitis, C. *Acoustic Emission Based Closed-Loop Focused Ultrasound System for Targeted and Controlled BBB-Opening in Rodents in 2021 IEEE International Ultrasonics Symposium* (Xi'an, China, Sept. 2021).
14. Lee, H., **Schoen Jr, S.**, Guo, Y., Kim, C. & Arvanitis, C. *A Closed-loop Focused Ultrasound System for Controlled and Targeted Antibody Delivery in Central Nervous System in American Institute of Ultrasound in Medicine* (Virtual, Apr. 2021).
15. **Schoen, S. J.** & Arvanitis, C. Spatial characterization of high intensity focused ultrasound fields in the brain. *The Journal of the Acoustical Society of America* **148**, 2560–2560. eprint: <https://doi.org/10.1121/1.5147103> (2020).
16. **Schoen Jr, S. J.**, Zhao, Z., Huang, C., Chen, S. & Arvanitis, C. D. *Computationally Efficient Methods for Vascular Characterization with Super-resolution Ultrasound in Biomedical Engineering Society 2020 Annual Meeting* (Virtual, Oct. 2020).
17. Lee, H., **Schoen Jr, S. J.**, Guo, Y., Kim, C. & Arvanitis, C. D. *Autonomous Ultrasound System for Targeted Drug Delivery in Central Nervous System with Sub-millimeter Targeting Accuracy in 2020 IEEE International Ultrasonics Symposium* (Las Vegas, NV USA, Sept. 2020).
18. **Schoen Jr, S. J.**, Zhao, Z., Huang, C., Chen, S. & Arvanitis, C. D. *Super-Resolution Ultrasound with Morphological Image Reconstruction and Local Projection for Microvascular Characterization in 2020 IEEE International Ultrasonics Symposium* (Las Vegas, NV USA, Sept. 2020).
19. **Schoen Jr, S. J.** & Arvanitis, C. Heterogeneous angular spectrum method for trans-skull imaging and focusing. *The Journal of the Acoustical Society of America* **146**, 2813–2813 (2019).
20. **Schoen Jr, S. J.**, Zhao, Z. & Arvanitis, C. D. Efficient sub-diffraction passive cavitation imaging. *The Journal of the Acoustical Society of America* **145** (2019).
21. **Schoen Jr, S. J.**, Zhao, Z., Guo, Y. & Arvanitis, C. D. *Spectrally Resolved Super-Resolution Ultrasound for Microvascular Imaging and Quantification in 2019 IEEE International Ultrasonics Symposium* (Glasgow, Scotland, Oct. 2019).
22. **Schoen Jr, S. J.**, Patel, A. & Arvanitis, C. D. *Real-Time Closed-Loop Spatiotemporal Control of Cavitation Activity with Passive Acoustic Mapping in 2018 IEEE International Ultrasonics Symposium* (Kobe, Japan, Oct. 2018).
23. **Schoen Jr, S. J.**, Zhao, Z. & Arvanitis, C. D. *Super-Resolution Passive Acoustic Imaging of Microbubbles in Biomedical Engineering Society 2018* (Atlanta, GA USA, Oct. 2018).
24. **Schoen Jr, S. J.**, Patel, A. & Arvanitis, C. D. *A Real-Time Passive Acoustic Mapping-Based Cavitation Controller in 18th Meeting of the International Society for Therapeutic Ultrasound* (Nashville, TN USA, May 2018).
25. **Schoen Jr, S. J.** & Arvanitis, C. D. Passive acoustic mapping in aberrating media with the angular spectrum approach. *The Journal of the Acoustical Society of America* **141**, 3459 (2017).
26. **Schoen Jr, S. J.** & Arvanitis, C. D. *Passive Acoustic Mapping with the Angular Spectrum Approach and Methods for Aberration Correction in 2017 Joint IEEE ISAF-IVATMD-PFM Conference* (Atlanta, Georgia, June 2017).

27. Copenhaver, B. J., **Schoen Jr, S. J.** & Haberman, M. R. Toward reliable metrics for Sacred Harp singing spaces. *The Journal of the Acoustical Society of America* **134**, 3969–3969 (2013).
28. **Schoen Jr, S. J.**, Ilinskii, Y. A., Zabolotskaya, E. A. & Hamilton, M. F. Low-frequency measurement of encapsulated bubble compressibility. *The Journal of the Acoustical Society of America* **132**, 2039 (2012).
29. Georgiev, G., Cabrera, Y., Wielgus, L., **Schoen Jr, S.**, Ivy, D. & Cebe, P. *Melt-Quench Formed Smectic Phase in iPP/CNT Nanocomposites and its Re-Crystallization* in *Symposium HH/II/JJ: Polymer-Based Materials and Composites – Synthesis, Assembly and Applications* **1312** (2011).
30. Georgiev, G., **Schoen Jr, S.**, Ivy, D., Wielgus, L., Cabrera, Y. & Cebe, P. *Crystallization Kinetics in Isotactic Polypropylene Films with Carbon Nanotubes* in *Symposium HH/II/JJ: Polymer-Based Materials and Composites – Synthesis, Assembly and Applications* **1312** (2011).
31. Georgiev, G., **Schoen Jr, S.**, Cabrera, Y., Wielgus, L. & Cebe, P. *Carbon Nanotubes Speed Crystallization of Polymers* in *Nanotech 2011 Conference and Expo* (June 2011).
32. Georgiev, G., **Schoen Jr, S.**, Ivy, D. & Cebe, P. *Crystallization effects of carbon nanotubes on semicrystalline isotactic polypropylene* in *Bulletin of the American Physical Society* **56** (American Physical Society, Dallas, TX, Mar. 2011).
33. Georgiev, G., **Schoen Jr, S.**, Ivy, D., Wielgus, L., Cabrera, Y. & Cebe, P. *Crystal Nanostructuring in Isotactic Polypropylene-carbon Nanotubes Films* in *Symposium JJ: Nanostructured Polymeric Materials – Synthesis and Assembly* (Dec. 2010).
34. Georgiev, G., **Schoen Jr, S. J.**, Ivy, D., Gombos, E., McIntyre, M. & Cebe, P. *Smectic phase and crystallization of multiwalled carbon nanotubes/isotactic polypropylene formed through melt-quenching* in *Division of Polymeric Materials: Science and Engineering, Sci-Mix* (Boston, MA, Aug. 2010).
35. Georgiev, G., Judith, R., Gombos, E., McIntyre, M., **Schoen Jr, S.**, Cebe, P. & Mattera, M. *Isotactic polypropylene carbon nanotube composites – crystallization and ordering behavior* in *Bulletin of the American Physical Society* **55** (American Physical Society, Portland, OR, Mar. 2010).