Alycen Wiacek, PhD

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AREAS OF SPECIALIZATION

Ultrasound imaging, photoacoustic imaging, breast imaging, coherence-based beamforming, artificial intelligence, deep learning, machine learning, image-guided surgery, clinical translation.

EDUCATION

Johns Hopkins University, Baltimore, MD
Ph.D. in Electrical Engineering — June 2022
Preparing Future Faculty Teaching Academy Certificate — November 2021
M.S.E. in Electrical Engineering, 4.0 GPA — May 2019

Oakland University, Rochester Hills, MI
M.S. in Electrical and Computer Engineering Engineering, 3.93 GPA — December 2015
Concentration: Signal Processing

Wayne State University, Detroit, MI
B.S. in Electrical Engineering, 3.94 GPA — May 2014
Minor in Mathematics, Summa Cum Laude

PROFESSIONAL APPOINTMENTS

Assistant Professor, Oakland University, Rochester, MI — August 2022
Department of Electrical and Computer Engineering
Department of Bioengineering

PROFESSIONAL MEMBERSHIPS

Institute for Electrical and Electronics Engineers (IEEE)
IEEE Engineering in Medicine and Biology Society
IEEE Women in Engineering
IEEE Ultrasonics Ferroelectrics and Frequency Control Society
American Institute of Ultrasound in Medicine (AIUM)
International Society for Optics and Photonics (SPIE)
Biomedical Engineering Society (BMES)

AWARDS & HONORS

2022	AIUM New Investigator Award
2022	Siebel Scholar Class of 2022, Press: Siebel Foundation, JHU Hub, JHU ECE ($35,000)
2021-2022	JCM Foundation Scholar of the ARCS/MWC Foundation ($15,000)
2021	Rising Stars in EECS at MIT Participant
2021	SPIE Photonics West Student Author Conference Support Award
2020	MICCAI Student Participation Award
2019	Johns Hopkins Whiting School of Engineering Excellence in Research Trainee Award ($500)
2018	IEEE International Ultrasonics Symposium Elevator Pitch Competition Winner
2018	IEEE International Ultrasonics Symposium Travel Award
2017-2018	Virginia and Edward M. Wysocki, Sr. Memorial Fellowship Awardee ($3,500)
2014	College of Engineering High Scholastic Average Award
2013-2014	College of Engineering Dean's Award Winner
2010-2014	8-time Athletic Director's Hall of Fame honoree
2010-2014	4-year Varsity Letter Winner – Women's Swimming

PUBLICATIONS

Peer-reviewed Journal Publications

1. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Photoacoustic-guided laparoscopic and open hysterectomy procedures demonstrated with human cadavers," *IEEE Transactions on Medical Imaging*, vol. 40, no. 12, pp. 3279–3292, 2021, https://doi.org/10.1109/TMI.2021.3082555
2. D. Hyun, **A. Wiacek**, S. Goudarzi, S. Rothlübbers, A. Asif, K. Eickel, Y. C. Eldar, J. Huang, M. Mischi, H. Rivaz, D. Sinden, R. J. van Sloun, H. Strohm, and M. A. L. Bell, "Deep Learning for Ultrasound Image Formation: CUBDL Evaluation Framework & Open Datasets," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 68, no. 12, pp. 3466–3483, 2021, https://doi.org/10.1109/TUFFC.2021.3094849
3. **A. Wiacek** and M. A. L. Bell, "Photoacoustic-guided surgery from head to toe," *Biomedical Optics Express*, vol. 12, no. 4, pp. 2079–2117, 2021, [**Invited Review**] https://doi.org/10.1364/BOE.417984
4. J. Huang, **A. Wiacek**, K. M. Kempski, T. Palmer, J. Izzi, S. Beck, and M. A. L. Bell, "Empirical assessment of laser safety for photoacoustic-guided liver surgeries," *Biomedical Optics Express*, vol. 12, no. 3, pp. 1205–1216, 2021, https://doi.org/10.1364/BOE.415054
5. **A. Wiacek**, E. González, and M. A. L. Bell, "CohereNet: A deep learning architecture for ultrasound spatial correlation estimation and coherence-based beamforming," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 67, no. 12, pp. 2574–2583, 2020, [**Featured on Journal Cover**] https://doi.org/10.1109/TUFFC.2020.2982848
6. **A. Wiacek**, E. Oluyemi, K. Myers, L. Mullen, and M. A. L. Bell, "Coherence-based beamforming increases the diagnostic certainty of distinguishing fluid from solid masses in breast ultrasound exams," *Ultrasound in Medicine & Biology*, vol. 46, no. 6, pp. 1380–1394, 2020, https://doi.org/10.1016/j.ultrasmedbio.2020.01.016
7. M. Graham, F. Assis, D. Allman, **A. Wiacek**, E. González, M. Gubbi, J. Dong, H. Hou, S. Beck, J. Chrispin, and M. A. L. Bell, "In vivo demonstration of photoacoustic image guidance and robotic visual servoing for cardiac catheter-based interventions," *IEEE Transactions on Medical Imaging*, vol. 39, no. 4, pp. 1015–1029, 2020, https://doi.org/10.1109/TMI.2019.2939568
8. K. M. Kempski, **A. Wiacek**, M. Graham, E. González, B. Goodson, D. Allman, J. E. Palmer, H. Hou, S. Beck, J. He, and M. A. L. Bell, "In vivo photoacoustic imaging of major blood vessels in the pancreas and liver during surgery," *Journal of Biomedical Optics*, vol. 24, no. 12, p. 121905, 2019, https://doi.org/10.1117/1.JBO.24.12.121905
9. **A. Wiacek**, O. M. H. Rindal, E. Falomo, K. Myers, K. Fabrega-Foster, S. Harvey, and M. A. L. Bell, "Robust short-lag spatial coherence imaging of breast ultrasound data: Initial clinical results," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 66, no. 3, pp. 527–540, 2019, https://doi.org/10.1109/TUFFC.2018.2883427

Conference Proceedings

1. **A. Wiacek**, E. Oluyemi, K. Myers, E. Ambinder, and M. A. L. Bell, "Quantifying the impact of breast density on the lag-one coherence of hypoechoic masses," in *2021 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2021, pp. 1–4, https://doi.org/10.1109/IUS52206.2021.9593611
2. **A. Wiacek**, N. Dehak, and M. A. L. Bell, "Extending CohereNet to retain physical features when classifying benign or malignant breast masses," in *2021 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2021, pp. 1–4, https://doi.org/10.1109/IUS52206.2021.9593710
3. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Parking sensor-inspired approach to photoacoustic-guided hysterectomy demonstrated with human cadavers," in *Photons Plus Ultrasound: Imaging and Sensing 2021*, vol. 11642. International Society for Optics and Photonics, 2021, p. 116420T, https://doi.org/10.1117/12.2579023
4. K. M. Kempski, M. Graham, **A. Wiacek**, M. Gubbi, and M. A. L. Bell, "Generalized contrast-to-noise ratio as a metric of photoacoustic image quality," in *Photons Plus Ultrasound: Imaging and Sensing 2021*, vol. 11642. International Society for Optics and Photonics, 2021, p. 116421C, https://doi.org/10.1117/12.2579055
5. **A. Wiacek**, E. Oluyemi, K. Myers, L. Mullen, and M. A. L. Bell, "Coherence-based beamforming improves the diagnostic certainty of breast ultrasound exams," in *2020 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2020, pp. 1–4, https://doi.org/10.1109/IUS46767.2020.9251439
6. Z. Li, **A. Wiacek**, and M. A. L. Bell, "Beamforming with deep learning from single plane wave RF data,"

in *2020 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2020, pp. 1–4, https://doi.org/10.1109/IUS46767.2020.9251736

7. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Dual-wavelength photoacoustic imaging for guidance of hysterectomy procedures," in *Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVIII*, vol. 11229. International Society for Optics and Photonics, 2020, p. 112291D, https://doi.org/10.1117/12.2544906
8. M. T. Graham, F. Assis, D. Allman, **A. Wiacek**, E. González, M. R. Gubbi, J. Dong, H. Hou, S. Beck, J. Chrispin, and M. A. L. Bell, "Photoacoustic image guidance and robotic visual servoing to mitigate fluoroscopy during cardiac catheter interventions," in *Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XVIII*, vol. 11229. International Society for Optics and Photonics, 2020, p. 112291E, https://doi.org/10.1117/12.2546910
9. **A. Wiacek**, E. González, N. Dehak, and M. A. L. Bell, "CohereNet: A deep learning approach to coherence-based beamforming," in *2019 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2019, pp. 287–290, https://doi.org/10.1109/ULTSYM.2019.8925879
10. **A. Wiacek**, K. C. Wang, and M. A. L. Bell, "Techniques to distinguish the ureter from the uterine artery in photoacoustic-guided hysterectomies," in *Photons Plus Ultrasound: Imaging and Sensing 2019*, vol. 10878. International Society for Optics and Photonics, 2019, p. 108785K, https://doi.org/10.1117/12.2510716
11. K. M. Kempski, **A. Wiacek**, J. Palmer, M. Graham, E. González, B. Goodson, D. Allman, H. Hou, S. Beck, J. He, and M. A. L. Bell, "In vivo demonstration of photoacoustic-guided liver surgery," in *Photons Plus Ultrasound: Imaging and Sensing 2019*, vol. 10878. International Society for Optics and Photonics, 2019, p. 108782T, https://doi.org/10.1117/12.2510500
12. E. González, **A. Wiacek**, and M. A. L. Bell, "Visualization of custom drill bit tips in a human vertebra for photoacoustic-guided spinal fusion surgeries," in *Photons Plus Ultrasound: Imaging and Sensing 2019*, vol. 10878. International Society for Optics and Photonics, 2019, p. 108785M, https://doi.org/10.1117/12.2510688
13. **A. Wiacek**, E. Falomo, K. Myers, O. M. H. Rindal, K. Fabrega-Foster, S. Harvey, and M. A. L. Bell, "Clinical feasibility of coherence-based beamforming to distinguish solid from fluid hypoechoic breast masses," in *2018 IEEE International Ultrasonics Symposium (IUS)*. IEEE, 2018, pp. 1–4, https://doi.org/10.1109/ULTSYM.2018.8579846

PRESENTATIONS

1. **A. Wiacek**, E. Oluyemi, K. Myers, E. Ambinder, and M. A. L. Bell, "Clinical implications of spatial coherence features on breast ultrasound," American Institute of Ultrasound in Medicine (AIUM) Annual Meeting, San Diego, CA, March 15, 2022, Oral presentation.
2. **A. Wiacek**, E. Oluyemi, K. Myers, E. Ambinder, and M. A. L. Bell, "Quantifying the impact of breast density on the lag-one coherence of hypoechoic masses," IEEE International Ultrasonics Symposium (IUS), Virtual, September 14th, 2021, Poster presentation.
3. **A. Wiacek**, N. Dehak, and M. A. L. Bell, "Extending CohereNet to retain physical features when classifying benign or malignant breast masses," IEEE International Ultrasonics Symposium (IUS), Virtual, September 15th, 2021, Poster presentation.
4. **A. Wiacek**, E. Oluyemi, K. Myers, L. Mullen, and M. A. L. Bell, "Improving diagnostic certainty in breast ultrasound with coherence-based beamforming," International Symposium on Ultrasonic Imaging and Tissue Characterization (UITC), Virtual, June 3rd, 2021, Oral presentation.
5. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Parking sensor-inspired approach to photoacoustic-guided hysterectomy demonstrated with human cadavers," SPIE Photonics West, Virtual, March 6-11, 2021, Oral presentation.
6. **A. Wiacek**, E. Oluyemi, K. Myers, L. Mullen, and M. A. L. Bell, "Coherence-based beamforming improves the diagnostic certainty of breast ultrasound exams," IEEE International Ultrasonics Symposium (IUS), Virtual, September 10th, 2020, Oral presentation.
7. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Dual-wavelength photoacoustic-guided hysterectomy demonstration with a human cadaver," IEEE International Ultrasonics Symposium (IUS), Virtual, September 9th, 2020, Poster presentation.
8. **A. Wiacek**, K. C. Wang, H. Wu, and M. A. L. Bell, "Dual-wavelength photoacoustic imaging for guidance of hysterectomy procedures," SPIE Photonics West, San Francisco, CA, February 1-6, 2020, Oral presentation.
9. **A. Wiacek**, E. Falomo, K. Myers, S. Harvey, and M. A. L. Bell, "Distinguishing solid from fluid breast

masses with coherence-based ultrasound imaging," Biomedical Engineering Society (BMES) Annual Meeting, Philadelphia, PA, October 17th, 2019, Oral presentation.

10. **A. Wiacek**, E. González, N. Dehak, and M. A. L. Bell, "CohereNet: A deep learning approach to coherence-based beamforming," IEEE International Ultrasonics Symposium (IUS), Glasgow, UK, October 7th, 2019, Oral presentation.
11. **A. Wiacek**, E. Falomo, K. Myers, S. Harvey, and M. A. L. Bell, "Distinguishing solid from fluid breast masses with coherence-based ultrasound imaging," International Symposium on Ultrasonic Imaging and Tissue Characterization (UITC), Arlington, VA, June 6th, 2019, Oral presentation.
12. **A. Wiacek**, E. Falomo, K. Myers, S. Harvey, and M. A. L. Bell, "Coherence-based beamforming to improve the diagnostic power of breast ultrasound imaging," Johns Hopkins Department of Medicine Research Retreat, Baltimore, MD, March 1st, 2019, Poster presentation.
13. **A. Wiacek**, K. C. Wang, and M. A. L. Bell, "Techniques to distinguish the ureter from the uterine artery in photoacoustic-guided hysterectomies," SPIE Photonics West, San Francisco, CA, February 2-7, 2019, Poster presentation.
14. **A. Wiacek**, E. Falomo, K. Myers, O. M. H. Rindal, K. Fabrega-Foster, S. Harvey, and M. A. L. Bell, "Clinical feasibility of coherence-based beamforming to distinguish solid from fluid hypoechoic breast masses," IEEE International Ultrasonics Symposium (IUS), Kobe, Japan, October 25th, 2018, Oral presentation.
15. **A. Wiacek**, O. M. H. Rindal, E. Falomo, K. Myers, K. Fabrega-Foster, S. Harvey, and M. A. L. Bell, "Application of robust short-lag spatial coherence beamforming to breast ultrasound data," International Symposium on Ultrasonic Imaging and Tissue Characterization (UITC), Arlington, VA, May 30th, 2018, Oral presentation.

INTELLECTUAL PROPERTY

- **A. Wiacek** and M. A. L. Bell, "Using machine learning techniques to obtain coherence functions for use in correlation estimation applications," PCT International Patent Application Number PCT/US20/53070. Patent Pending, Filed September 28, 2020
- **A. Wiacek** and M. A. L. Bell, "Using machine learning techniques to obtain coherence functions used to generate short-lag spatial coherence images for distinguishing solid masses from fluid-filled masses," Provisional Patent Application Number 62/907,356, Filed September 27, 2019

TEACHING EXPERIENCE

HEART Instructor, Johns Hopkins University, Baltimore, MD Fall 2021

- Selected by the Vice Dean for Undergraduate Education to design a course for the Hopkins Engineering Applications & Research Tutorials (HEART)
- Instructor of record for first year undergraduate students entitled: "Machine Learning in Ultrasound and Photoacoustic Imaging"
- Construct a hands-on project and develop a reading list to inspire and encourage life-long learning
- Received excellent student evaluations:
  - Average course quality 5/5 (school average was 4.15/5)
  - Average instructor effectiveness 5/5 (school average was 4.18/5)

Teaching Assistant, Johns Hopkins University, Baltimore, MD
Medical Imaging Systems Fall 2018, 2019, 2020 & 2021
Ultrasound and Photoacoustic Beamforming Spring 2021

- Give guest lectures, grade homework and exams, provide one-on-one assistance for class projects. Host TA office hours for students to obtain additional assistance on assignments.

Teaching Academy Participant, Johns Hopkins University, Baltimore, MD Fall 2018 - present

- Learn and practice current pedagogical principles such as preparing a syllabus, creating inclusive teaching settings, evaluation to improve instruction, backward design, active learning strategies, and effective rubrics for grading and student assessment
- Johns Hopkins Teaching Academy Preparing Future Faculty Certificate, November 2021

Athletic Department Student Tutor, Wayne State University, Detroit, MI Sept 2012 – May 2014

- Worked with fellow student-athletes in physics, chemistry, biology, and mathematics

LEADERSHIP, MENTORING, AND OUTREACH ACTIVITIES

Graduate Association of Women in CS & ECE
President Fall 2018 – present
Treasurer Fall 2017 – Spring 2018
- Organize and lead networking and mentoring activities
- Maintain the budget and financial records

Science Fair Judge, Stuart Hobson Middle School Virtual Science Fair February 2021
- Provide constructive feedback to middle school students on their science fair projects

Mentor, STEM Achievement in Baltimore Elementary Schools (SABES) Fall 2019-Spring 2020
- Teach STEM-based lessons to 3rd-5th grade students
- Design a syllabus to prepare students for their student-led STEM project
- Student-led project: LED direction system for Pimlico Elementary (project put on pause at the design phase due to COVID-19)
- Present in the virtual "Meet an Engineer" segment inspiring students to pursue STEM careers and answer questions about STEM

Center for Educational Outreach Volunteer, Barclay Elementary/Middle School Spring 2019 & 2020
- Teach a 7th grade classroom about circuits through a "Squishy Circuits" activity where students design elaborate circuits using conductive and insulating Play-Doh

Mentor, Girl Scouts of Central Maryland Roller Coaster Event Spring 2018, 2019 & 2020
- Mentor a team of 3rd-6th grade girls to create a marble roller coaster based on pre-defined design specifications
- Design "Brain Games" for the girls to participate in fun, science-based activities in between building their roller coasters
- Part of L'Oréal USA's Changing the Face of STEM Mentoring Grant awarded to Dr. Sridevi Sarma
- Article about the event

NSF REU Research Mentor, Johns Hopkins University Summer 2018
- Mentor three undergraduate students to complete summer research projects including:
  - Design of a Light Delivery System for Visual Servoing of Scissor Locations During Photoacoustic-Guided Liver Surgery
  - In vivo Photoacoustic Image Guidance of Abdominal Surgery
  - Exploring Tissue-Specific Laser Safety Limits for Photoacoustic-Guided Surgery

After-school STEM Mentor, Western High School Fall 2017
- Mentor high school girls to design and build Arduino-based light up necklaces

Treasurer, Institute for Electrical and Electronics Engineers, WSU Chapter Fall 2013 – Spring 2014
- Maintained financial records and coordinated fundraising efforts. Provided resources for new students. Participated in STEM outreach activities.

Team Captain, Wayne State University, Varsity Women's Swimming and Diving Fall 2012 – Spring 2014
- Lead team of 30+ women at practices and competitions.
- Organized fundraising and training activities.
- Great Lakes Intercollegiate Athletic Conference (GLIAC) Champions (all four seasons), NCAA Division 2 National Champions 2012

Student-Athlete Activities Committee – Member, Wayne State University. Fall 2011 – Spring 2012
- Served as the representative for women's swimming to discuss important topics related to student athletes with the athletic department and university administration.

Student-Athlete Leadership Council – Member, Wayne State University. Fall 2012 – Spring 2014
- Attend bi-weekly seminars hosted by the athletic and university administration to discuss strategies for motivation and leadership of peers.

PROFESSIONAL SERVICE

Reviewer for the following journals and conferences:

IEEE Transactions on Medical Imaging (TMI)
IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (T-UFFC)
IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
Biomedical Optics Express (BOE)
Optics Letters
Ultrasonic Imaging
Quantitative Imaging in Medicine and Surgery (QIMS)
World Journal of Surgical Oncology (WJSO)
IEEE International Symposium on Biomedical Imaging (ISBI) 2020
International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) 2021, 2022
Reviewer profile: https://publons.com/researcher/3857818/alycen-wiacek/

UNIVERSITY SERVICE

Making Connections: We Go Further Together Panelist,
Office of the Vice Provost of Graduate and Professional Education, Johns Hopkins University. Fall 2021

- The inaugural university wide welcome event for 1st and 2nd year PhD students focused on creating space for graduate students from under-represented or marginalized backgrounds. Celebrating what makes Hopkins a diverse, vibrant, and inclusive community.
- Serve as a panelist with the identity "women in male-dominated fields" and share my experiences and tips and tricks to make meaningful connections at Johns Hopkins

Graduate Student Committee Member,
ECE Department Head Search, Johns Hopkins University. Spring 2021

- Selected by the ECE faculty to provide input on the selection of the ECE Department Head
- Lead the graduate student committee to interview top candidates and provide timely feedback to the faculty search committee

Prospective PhD Student Panel Moderator, Johns Hopkins University. Spring 2019, 2020, 2021, & 2022

- Organize and moderate a panel of PhD current students to help provide insight into the PhD program for prospective PhD students

WSE External Review - PhD Student Committee, Johns Hopkins University. Spring 2019

- Provide feedback about the graduate program to external reviewers

CISS Student Worker, Johns Hopkins University. Spring 2018

- Assist with participant registration for the Conference on Information Sciences and Systems (CISS) hosted at Johns Hopkins in 2018