Kyle T. Rich

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Biomedical engineering PhD candidate seeking to leverage proven quantitative and analytic background in an industry role. Broad experience utilizing computational, theoretical, experimental, and statistical methods to derive data-driven results. Passionate problem solver capable of working effectively on individual- and team-based technical projects with ability to visualize and communicate results.

Skills

Programming/Visualization: MATLAB, R, Python (NumPy/SciPy/Matplotlib/Seaborn/Pandas*/scikit-learn*), Mathematica, Git, LaTeX, Linux\Unix environment, Tableau*, Spotfire* (* basic experience)

Technical: Data interpretation and visualization, computational/mathematical/statistical modeling, time series, digital signal processing, error and uncertainty analysis, hypothesis testing, statistical analysis (ANOVA, regression, ROC), acoustic characterization, instrument control and characterization

Education

PhD candidate, Biomedical Engineering Program
University of Cincinnati, Cincinnati, OH — Anticipated defense: Feb 2017

Bachelor of Science (B.Sc.), Physics (minor: Mathematics)
Northern Kentucky University, Highland Heights, KY — May 2008

Work Experience

Research Assistant, University of Cincinnati, Cincinnati, OH — 2009 – Present

- Established standard procedures for quantitative frequency-domain passive detection of microbubble cavitation during therapeutic ultrasound applications
- Established and employed standard techniques for receive sensitivity calibration of acoustic sensors for absolute pressure measurements, reduced calibration uncertainty to $<10\%$
- Developed signal processing algorithms to monitor, model, and quantify time-series spectral components associated with acoustic emissions generated by microbubble cavitation
- Developed algorithms for numerically simulating transmitted, scattered, and radiated acoustic field measurements to support theoretical quantitative monitoring models
- Fabricated and programmed novel devices for autonomous 3–D raster scanning, measurement and real-time spectral analysis of scattered and transmitted acoustic fields
- Developed analytic model to account for random diffraction effects in measured microbubble-radiated acoustic fields, enabling quantification of bubble-radiated acoustic power. Leveraged random processes simulations to validate model and assess uncertainty to ± 1 decibel
- Authored 4 peer-reviewed publications, presented data-driven results at national science conferences and to technical and non-technical audiences

Assistant to Editor-in-Chief, Ultrasound in Medicine and Biology (UMB) — Jun 2013 – Jun 2014

- Performed primary review of appx. 40 manuscripts submitted for publication per month
- Revised branding logo for website and download content

Research Trainee, National Science Foundation IGERT: Biomembranes — Dec 2010 – Dec 2012

- Devised research grant that was awarded funding over a 2 year period ($30k/yr)
- Developed algorithms for signal processing and statistical analysis of >300 GB of collected data leading to discovery of empirical relationship between microbubble cavitation emissions and skin permeabilization for ultrasound-enhanced transdermal drug delivery

Research Assistant, Northern Kentucky University, Highland Heights, KY — Jan 2008 – May 2008

- Developed and analyzed bulk-produced CoFe(x)O(y) (cobalt ferrite) composites for potential pressure sensors applications using WAXS and impedance characterization techniques

Selected Publications

K. Haworth, K. Bader, **K. T. Rich**, *et. al.*, "Quantitative Frequency-Domain Passive Cavitation Imaging," *IEEE Trans. Ultrason., Ferroelect., Freq. Control*, 2017. DOI:10.1109/TUFFC.2016.2620492

K. T. Rich and T. D. Mast, "Methods to calibrate the absolute receive sensitivity of single-element, focused transducers," *J. Acoust. Soc. Am.*, 2015. DOI:10.1121/1.4929620

K. T. Rich, *et. al.*, "Relations between acoustic cavitation and skin resistance during intermediate- and high-frequency sonophoresis," *J. Control. Release*, 2014. DOI:10.1016/j.jconrel.2014.08.007