ROBERT G. HOHLFELD, PHD

RESEARCH SCIENTIST AND ENGINEER

rhohlfeld@wavelettech.com • linkedin.com/in/robert-hohlfeld-91611a19 *508.222.6676 • Attleboro, MA 02703*

Top-performing, innovative research scientist with extensive engineering experience within highly competitive technology industries. Analytical professional skilled in applied mathematics and physics to develop new algorithms for effectively resolving scientific problems. Accomplished in a wide variety of engineering research positions including significant work for various branches of the Department of Defense and private industry. Interpersonal communicator focused on building partnerships and promoting collaboration across teams to drive positive change for new, state-of-the-art scientific and technological advancement. *Areas of Expertise include:*

- Strategic Engineering Planning
- Advanced Statistics
- Quantitative Analytics
- Machine Learning
- Signal Processing
- Medical Devices
- Matlab & Mathematica
- Staff Training & Leadership
- Simulations & Modeling
- Algorithms
- Image Processing
- Problem Resolution

PROFESSIONAL EXPERIENCE

WAVELET TECHNOLOGIES, INC • Attleboro, MA • 1995 – Present

Driving product innovation for companies developing medical devices and radio frequency systems.

PRINCIPAL

Provide a strategic technical role as software/algorithmic lead on a development project for a technical startup. Previously led high-level critical research and development projects to positively impact various industries including medical, government and advanced technology.

KEY ACCOMPLISHMENTS:

- Currently serve as software lead and algorithm designer for a startup developing a new medical device that performs remote ischemic conditioning in an automated manner.
- Successfully obtained five Department of Defense SBIR Phase I contracts.
- Participated in the development of a machine classification algorithm for identifying and classifying white blood cells in microscopic images. Primarily responsible for parts of the classification network identifying rare and pathological cell types using Bayesian classification methods, resulting in a patent for the classification network.

BOSTON UNIVERSITY CENTER FOR COMPUTATIONAL SCIENCE • Boston, MA

Connecting multidisciplinary exchange of ideas among researchers, educators, and students.

RESEARCH ASSOCIATE PROFESSOR & FACULTY MEMBER

Concurrently develop applications of massively parallel supercomputers to simulation and solution of physical problems while teaching graduate-level computer architecture course in the College of Engineering.

KEY ACCOMPLISHMENTS:

- Supervised two PhD theses and participated in some of the first very large gravitational N-body simulations using massively parallel computation.
- Developed finite difference time domain algorithms for computational wave propagation working on the second-order (Helmholtz) equation. Algorithms notable for excellent independence from the underlying grid.
- Published numerous research papers in computational science, digital signal processing, and related areas.
- Developed genetic algorithms for antenna design.

BIOMEDICAL ENGINEERING & LARGE-SCALE COMPUTATION PROJECTS

1. Remote Ischemic Conditioning – Currently serving as software/algorithmic technical lead for a development project for a startup company. This project has technical connections to non-invasive blood pressure monitors. Applications of this technology center on inflammation-related traumas including diabetic foot ulcers and cardiac infarct.

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2. EKG Signal Processing – Used wavelet techniques for compression of EKG signals by 12:1. Demonstrated that reconstructed EKG signals were of sufficient quality to permit use in automated diagnostic programs. Separate projects developed an improved method for QRS detection in EKG waveforms and an automated method for detection of ventricular fibrillation.
3. Machine Classification of White Blood Cell Images – Partnered with researchers at Roche Diagnostics Hematology on machine classification of white blood cell images and identification of pathological conditions. This technology is being incorporated in Roche's Cobas line of hematologic equipment. A patent on classification networks developed in this work was issued in June 2017.
4. Image Processing – As Assistant Professor at Boston University, carried out development of a PC-based image processing system under a contract funded by Analogic Corporation. The original application was intended to be a machine vision system for manufacture. Work resulted in U.S. Patent 5,278,954. Image-processing package was applied to the analysis of digital X-ray images. Developed new classes of wavelets, the Associated-Hermite and Hermite-Rodriguez wavelets, with special applications to image processing, particularly image restoration and classes of inverse problems. These wavelets are described in a paper in the SIAM Journal of Applied Mathematics, "Solution of Convolution Integral Equations by the Method of Differential Inversion", volume 53, pp. 154167, (1993).
5. Non-Invasive Blood Pressure Monitors – Developed a wavelet-based method for the removal of transport artifacts and artifacts from patient shivering in continuous-bleed NIBP monitor data for the Patient Monitoring Division of Datascope (now Mindray) Corporation. In a separate project, developed artifact removal algorithms for stepped-bleed NIBP monitors for Philips Medical Systems.
6. Fetal Heart Monitors – Responsible for majority of software in Analogic's Fetalgard 2000 fetal heart monitor. Due to prior limitations of microprocessors, the monitor used a novel algorithm for approximation of the autocorrelation function, the Tuck-Hohlfeld algorithm. Assisted in FDA certification of the Fetalgard 2000. Responsible for roughtly half of the software in Analogic's Fetalgard 3000 fetal heart monitor. Participated in development of an approach (patented) to prevent spurious tracking on harmonic peaks of the autocorrelation function.
7. Control Methods for Cardiac Assist Pumps – Applied wavelet methods for improved detection of the dicrotic notch in invasive blood pressure data.
8. Detection of Otitis Medea – Assisted startup, MDI Instruments, Inc., to develop an instrument using acoustic techniques for sensing the presence of fluid in the middle ear. Led and rationalized existing software for the instrument, participated in analysis of clinical test data, and assisted in FDA certification of the instrument. Developed part of automated testing software used in the manufacture of the instrument. Worked directly with the CEO and for approximately 18 months served as the de facto CTO of the company. This product is now commercially available.
9. Large-Scale Computation/Computer Architecture – Serve as long-term member of Boston University's Center for Computational Science, working on applications of massively parallel supercomputers to simulation and solution of physical problems. Dr. Hohlfeld also taught the graduate-level computer architecture course in the College of Engineering at Boston University.

EDUCATION & TRAINING

Doctor of Philosophy (PhD) – Astrophysics
CORNELL UNIVERSITY | Ithaca, NY

Bachelor of Science (SB) – Physics
MASACHUSETTS INSTITUTE OF TECHNOLOGY | Cambridge, MA

~ Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) ~

Patents:
Four in Biomedical Research · One in Physical Acoustics

Programming Languages & Software:
C · C++ · Fortran · Python · LaTeX · Lisp · Pascal

Languages:
English · German