CHRISTOPHER W. GREGORY, PHD

15257 Bowmans Folly Dr.
Manassas, VA 20112

414.839.4685 christophergregory@yahoo.com

TOP SECRET CLEARANCE

OBJECTIVE

Seeking research and development opportunities to support the needs of either the medical or defense/intelligence trades.

CAREER SUMMARY

A seasoned professional with more than 18 years of experience and a comprehensive understanding of imaging, pattern recognition, and signal processing skills for medical and defense applications. Technical experience in R&D for medical, defense, homeland defense and academic environments. Business experience as a co-founder of a medical device start-up company involved in planning, coordinating and integrating subsystems for prototype development. Strong interpersonal skills, effective communication abilities (both orally and written), and a record of documenting efforts to support engineering and business objectives.

CORE KNOWLEDGE AND CAPABILITIES

- Imaging and signal processing
  - Medical
  - Hyperspectral for IR/Visual and RF
  - Acoustic (sonar)
- Business and Management
  - Co-founded a medical device company
    - Planned, coordinated, and integrated prototype subsystems
  - First prize winner in the 2004 Wisconsin Governor's Business Plan Competition
- Analytical Skills
  - Algorithm development
  - Numerical analysis
  - Pattern recognition
  - Data fusion, correlation and discrimination
- Instrumentation
  - Prototype development for medical applications
- Innovations
  - Awarded 4 patents

PROFESSIONAL EXPERIENCE

EOIR Technologies/Night Vision and Electronic Sensors Directorate, Ft. Belvoir, VA **2010 – Present**

Consultant Software Engineer/Algorithm Developer
Applied advanced technical principles, theories, and concepts to develop algorithms that address imaging and radar problems while providing innovative solutions.

- Developed innovative algorithms for aerial surveillance detection and tracking. Used multiple methods for target detection that resulted in a robust algorithm capable of propagating through occluded regions. Presented results and anticipate full funding for continued development.
- Developed and implemented an efficient algorithm for detecting glint. Glint detection provides soldiers advanced notice of potential snipers. The algorithms demonstrated greater than 90% successful detection with less than 10% false alarms on test data.
- Implemented algorithms for combining multiple ground based radar detections and tracks. Algorithms minimized false alarms using statistical properties to filter out clutter while maximizing target detections.

RAYTHEON MISSILE SYSTEMS, Tucson, AZ **2007 – 2010**

Senior Multi-Disciplined Engineer I
Applied advanced technical principles, theories, and concepts to address complex technical problems and provide ingenious and innovative solutions. Presented analysis and recommendations, and directed / guided junior engineers.

- Innovated, and performed various trade studies and analysis which demonstrated improved relative performance (> 15%) for RADAR / IR track correlation on the Exo-atmospheric Kill Vehicle (EKV) by developing new concepts, models and algorithms. Results were published, and the customer plans on incorporating new methods into future business initiatives.
- Performed various trade studies and analysis which demonstrated increased number of tracks and added additional descriptive content contained in communication uplink messages while maintaining overall message size (in bytes) through modeling and simulating to identify optimal track precision versus mission performance.
- Successfully completed a customer requested, short notice, time constrained (6 week) internal research and development (IRAD) project on time and on budget while exceeding the customer's expectations by leading a junior engineer in model and algorithm development, simulation performance, and the analysis and recommendation's presentation.

NOVASCAN, LLC, Shorewood, WI **2004 – 2007**

Co-founder and Chief Development Engineer
NovaScan is a start-up company created to commercialize intellectual property (IP) conceived at the University of Wisconsin at Milwaukee. Led development efforts for a novel breast cancer screening device by creatively innovating, designing, modeling, simulating, and analyzing methods and apparatus.

- Awarded grand prize in the 2004 Wisconsin Governor's Business Plan Competition – (out of 330 entries).
- Successfully achieved approval for human subject testing from the Aurora Healthcare System Institutional Review Board (IRB) by developing models and performing simulations that demonstrated the safety and potential efficacy of the prototype impedance breast screening device, EPET II.
- Saved money and time, and rescued important data from being discarded by identifying and correcting (by post processing methods) a hardware induced phase shift anomaly in the measurement results for the EPET II device.
- Patent pending for the development of a method for detecting both pre-cancerous and cancerous tissues. Patent Application Number US 2008 / 0221475A1.
- Patent pending for the development of early breast cancer detection using a novel method called Electrical Property Enhanced Tomography. Patent Application Number US 2009 / 0264791A.

UNIVERSITY OF WISCONSIN AT MILWAUKEE, Milwaukee, WI **2002 – 2007**

Lead Researcher, Bio-impedance Imaging Laboratory
Lead laboratory researcher and development investigator. Primary research and development was done for breast cancer screening in which Electrical Property Enhanced Tomography (EPET), a novel bio-electric imaging method, was utilized.

- Successfully fabricated an impedance imaging device (test fixture and electronics) to test a new method for computing bio-impedance images by using numeric models to develop requirement, specifications, and a final design.
- Successfully demonstrated increased speed and accuracy of EPET imaging method (as compared to comparable methods) by designing and performing appropriate experimental studies.
- Awarded a patent for developing a method and apparatus for producing an electrical property image for homogenous objects containing inhomogeneities. Patent Number 7,627,362.

WEST VIRGINIA UNIVERSITY, Morgantown, WI **2000 – 2002**

Research Engineer
Applied extensive technical expertise to devise solutions to complex problems in bio-impedance imaging.

- Conceived a novel electrical impedance imaging method (EPET) by deriving from first principles a mathematical solution and corresponding numerical methods to achieve a solution.
- Awarded a patent for developing a method and apparatus for producing an electrical property image using a charge correlation matrix. Patent Number 6,763,263.

INSTITUTE FOR SCIENTIFIC RESEARCH, Fairmont, WV **1999 – 2000**

Project Engineer: Addressed problems involving hyper-spectral sensors and data mining techniques.

ANSER CORPORATION, Fairmont, WV **1998 – 1999**

Image Recognition Engineer: Developed light insensitive facial recognition methods using multiple camera video.

JHU APPLIED PHYSICS LABORATORY, Laurel, MD **1991 – 1995**

Associate Staff Scientist: Conducted analysis in sonar propagation for shallow water environments.

EDUCATION

PhD, Electrical Engineering, West Virginia University, Morgantown, WV

Dissertation Title: The use of Charge-Charge Correlation in Impedance Measurements: A Test of the EPET Method

Advisor: Bojan Cukic, PhD

MS, Control Systems Engineering, West Virginia University Institute of Technology, Montgomery, WV

MS, Physics, University of Illinois at Urbana-Champaign, Urbana, IL

BS, Physics, Clarkson University, Potsdam, NY

ADDITIONAL EXPERTISE

Computer Languages	Computer Operating Systems	Foreign Languages
Matlab, IDL, C , Fortran	UNIX, Linux, MS Windows, Macintosh	German and Spanish

DOCTORATE OF PHILOSOPHY RESEARCH

Ph.D. research demonstrated a 10,000-fold reduction in computation time with superior results for a new bio-electric imaging method. Completed research is now being utilized in a novel breast cancer screening device.

ABSTRACT

Published research has shown that all biological tissues possess electrical properties that vary among individual tissue types and vary between healthy and diseased regions within a tissue. These characteristics are extremely useful in medical diagnostics and treatment results. Electrical Impedance Tomography (EIT) is a modality that images internal electrical properties. EIT image reconstruction methods utilized in common applications suffer from high computational efforts, namely time consuming computations that are susceptible to estimation errors resulting from measurement noise.

This research resulted in an alternative method for estimating internal electrical properties. This method employed a technique called Electrical Property Enhanced Tomography (EPET). EPET does not attempt to create the image with the electrical data; instead it adds electrical property information to an existing companion image (CT or MRI). EPET requires the data from the 2nd modality to locate the position of internal structures. EPET uses a numerical method called charge-charge correlation, which was developed and modified to aid in electrical property estimations. The results of the experiments produced ten thousand-fold reduction in computation time while yielding relative errors of estimated results that were equal to or better than other methods commonly used in EIT.

AWARDS AND HONORS

Grand prize in the 2004 Wisconsin Governor's Business Plan Competition – (out of 330 entries)

The business plan proposed implementing a novel bio-electric imaging called Electrical Property Enhanced Tomography (EPET) for breast cancer screening.

PATENTS

- C.W. Gregory and W.D. Gregory, "Method and Apparatus for Producing an Electrical Property Image using Substantially Homogenous Objects Containing Inhomogeneities," Patent Number 7,627,362, Issued December 1, 2009.
- C.W. Gregory and W.D. Gregory, "Method and Apparatus for Producing an Electrical Property Image using a Charge Correlation Matrix," Patent Number 6,763,263, Issued July 13, 2004.
- C.W. Gregory and W.D. Gregory, "System and Method for Early Breast Cancer Detection using Electrical Property Enhanced Tomography," Patent Application Number US 2009/0264791A1, Published October 22, 2009.
- C.W. Gregory and W.D. Gregory, "Method for Detecting Both Pre-cancerous and Cancerous Tissues ," Patent Application Number US 2008/0221475A1, Published September 11, 2008 .

PUBLICATIONS AND CONFERENCES

- C.W. Gregory, The Use of Charge-charge Correlation in Impedance Measurement: A Test of the EPET Method, Ph.D. Dissertation, WVU, Morgantown, WV, 2005—*Dissertation*
- W.D. Gregory and C.W. Gregory, "Electrical Property Enhanced Tomography (EPET)," in the Proceedings of the 22nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, vol. 4, pp. 2632 – 2635, 2000—*Conference and Paper*
- C.W. Gregory, W.D. Gregory, and D.A. McRae, Electrical Property Enhanced Tomography (EPET) A combined modality imaging technique maximizing both spatial resolution and differentiation of pathologies in diagnosis and treatment, The Conference on Biomedical Imaging: Beyond Diagnostics, U. of Michigan, September 17-18, 1999—*Conference*
- W.D. Gregory, D.A. McRae and C.W. Gregory, "Electrical Property Tomography using the correlation of exterior-to-interior induced currents," presented at the World Congress on Medical Physics and Biomedical Engineering, Nice, France, 1997—*Conference*