

FRANK CROSBY, Ph.D.
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PROFESSIONAL EXPERIENCE:

Jan., 2001 – Present, Naval Surface Warfare Center – Panama City, Panama City, FL

Line Management

I have served as the head for the Advanced Signal Processing and Automatic Target Recognition Branch since August, 2010. The branch consists for a diverse group of engineers and scientists, both male and female, and with several different racial and ethnic backgrounds. Several members of the branch are members of the Diversity Council. I encourage their participation and emphasize to everyone how different experiences and points of view contribute to enterprise success.

My management position has allowed me to assign and structure tasks to allow members of my branch to pursue advanced degrees in areas that directly benefit the Navy. In my branch, I have had two members receive Ph.Ds. and two advance to Ph.D. candidacy. My contribution has not only been to structure tasks so that they can pursue their academic interest, but to also suggest related topic that benefit the Navy.

My goals as a branch head have been to not only develop the workforce academically, but also professionally. Branch head duties often involve CO/TD and visiting VIP briefings. I have done many of these, but more importantly I have taught and exposed most of my subordinate to these briefings. I have regular meetings where they practice giving presentations and everyone in my branch has had an opportunity to present their work to outside organizations. I discuss with each person in my branch or working on my programs how they can excel in their career and I help them choose an area of expertise.

Program Management

The Office of Naval Research (ONR) has Enabling Capabilities (EC) programs, which are multimillion dollar investments to mature scientific concepts. I began managing ONR EC programs in 2008.

The first EC was based on sensor fusion. I took over management of the product at the request of a manager that was being promoted. There were 7 government, 1 university and 1 private contractor team members. The budget averaged over \$1 million per year and successes included on-time milestone delivery, personnel adjustments for skill optimization, and budget management.

The next EC product that I managed was based on Automatic Target Recognition and called MCM Payload Automation. I have been an active project manager; contributing technical ideas and directions that are integrated with team member's ideas to produce high impact contributions. Examples of these are ATR enhancements such as: vehicle motion detection for false alarm reduction, a constant false alarm rate detector, user functionality, and operator display (parameter, version, and status notification). The team accomplished much more than these items. However, in each of these areas, I suggested the original idea and worked with team members on the implementation.

These ECs have successfully transitioned the topics from basic research to several acquisition Navy Programs (PMS 408, PMS 420, and PMS 495). This type of resource management has resulted in more applied research collaborations with academia and stronger customer relationships with acquisition sponsors.

Since 2012, I have served on the ILIR/IAR management committee. This committee evaluates the ILIR and IAR proposal at NSWC PCD. We also provide ongoing guidance to the principal investigators in terms of collaborations, research directions and warfare center alignment.

Strategic Initiatives:

I have led and contributed to several strategic initiatives as the request of sponsors (ONR) and the Naval Surface Warfare Center Panama City Division (NSWC PCD) management. I am co-lead on the NSWC PCD initiative to develop leaders throughout the organization.

I developed the Science and Technology Competency roadmap as part of the NSWC PCD Technical Director's competency framework to provide a consistent set of processes for career development and technical excellence. My report documented the influences that drive the processes and procedures within S&T competency, identified increments to move the competency from its current state to full operational capability and provided metrics to judge its effectiveness.

At ONR's request I have developed Automatic Target Recognition (ATR) roadmaps for technology development investments. These investments were not limited to government research, but covered academic, and industrial partners and plans for technology integration. These plans are updated every few years and cover basic research (6.1) topics that are promising, applied research (6.2) areas that have significant impact potential and Advanced Technology Development (6.3) in areas with high Fleet priority.

I have also developed strategic plans for my branch (Advanced Signal Processing & ATR). These branch level plans document how specific research and development supports the ONR, NAVSEA, and NSWC PCD strategic plans.

Research Scientist:

I have worked as the principal investigator (PI) on several research projects in Automatic Target Recognition. As a technical leader, I am first author on nine referred journal articles, numerous conference papers and a patent. One of the journal articles was voted "Best Scientific Paper in Remote Sensing" for the year 2007 by the American Society for Photogrammetry and Remote Sensing. The research that led to that paper was a collaboration that I began between NSWC PCD and Army Night Vision Labs. My publishing history continues to lead to requests to serve as a referee for several academic publications, including The Journal of Electronic Imaging, Photogrammetric Engineering and Remote Sensing, and the SPIE Journal Optical Engineering. I have further been recognized as a technical leader by being invited to give technical presentations at leading universities including: the University of California – San Diego, Georgia Institute of Technology, Purdue University, the University of Maryland, and the Naval Postgraduate School. My scientific accomplishments have also led to a Visiting Scholar appointment in the Mathematics Department at the Georgia Institute of Technology.

Project List:

Lead Algorithm Developer for the COBRA Program 2001-2002

Duties included developing and testing Registration, Multispectral detection, and compression processing algorithms for electro-optic sensors. Managed contractor, university and government participation to meet Marine Corps requirements.

Lead Algorithm Developer for the ALRT Program 2002 - 2004

Specializing in Optimal Polarization usage in Automatic Target Recognition. Also developed an algorithm for airborne based imaging through an air-water interface.

Principal Investigator for the Army Night Vision Lab's Enhanced Change Detection Program. Proposed, received funding and managed this program. This project produced an award winning journal article (see awards section). The algorithms were developed for an infra-red electro-optic sensor.

Principal Investigator for the High Resolution Sonar Identification program 2004-2007. Proposed this program to the Office of Naval Research (ONR), received funding, and managed this program. Developed algorithms, with university partners, for numerical computation of curvature and curvature based recognition applicable to both side-scan and synthetic aperture sonar technology.

Principal Investigator for the In Situ Training program 2008 -2011. Proposed this program to the Office of Naval Research (ONR), received funding, and managed this program. Developed mission processing strategies for unmanned systems. Managed university involvement to ensure program success.

Program Manager for the Advanced ATR program 2010 - current. Manage university and government team members to address advanced ATR requirements. There were 4 full time government team members and 2 universities.

Private Sector Experience

Aug., 1996 – Dec 2000, ERIM INTERNATIONAL, Niceville, FL

Research Scientist: Duties included developing and testing image processing algorithms, numerical optimization of existing programs, statistical analysis of operating characteristics.

Lead Algorithm developer for the COBRA Project

Duties included developing and testing image processing algorithms, numerical optimization of existing programs, and statistical analysis of operating characteristics. Developed several background and environmentally adaptive automatic target recognition algorithms to create an intelligent sensing system. Wrote algorithms to interface with vehicle navigation and guidance systems to improve target localization. The primary sensor was electro-optical.

Sept., 1995 - Aug., 1996 MEDICAL SCHOOL, UNIVERSITY OF MINNESOTA, Minneapolis, MN

Post-doctoral Researcher: Duties included developing image processing algorithms for Magnetic Resonance Imaging, implementation of algorithms using C and C++.

EDUCATION:

Ph.D. University of Florida, Gainesville, FL

Mathematics (Image Algebra) “Max-polynomials and Morphological Template Decomposition”

May, 1995

M.S. University of Michigan, Ann Arbor, MI

Applied Mathematics

May, 1991

AWARDS

American Society for Photogrammetry and Remote Sensing - Leica Geosystems Award for Best Scientific Paper in Remote Sensing, 2008

PEER REVIEWED PUBLICATIONS

Crosby, F. and SungHa Kang, "Object Identification in 3D Flash Lidar Images", *Journal of Pattern Recognition Research*, vol 2, 2011

Crosby, F. Haomin Zhou, Quyen Huynh, "Total Variation Methods for Three Dimensional Lidar Image Denoising", *Photogrammetric Engineering and Remote Sensing*, *Photogrammetric Engineering and Remote Sensing* vol 76, No. 12, 2010

Crosby, F., "Curvelet Decomposition for Detection of Cylindrical Targets", *IEEE International Conference on Image Processing*, Oct. 2008.

Crosby, F, "Using Curvature for Human Perception Inspired Target Identification", *Journal of Underwater Acoustics*, U.S. Navy Journal of Underwater Acoustics, vol. 57 No. 4 pp 533-546, Oct. 2007.

Crosby, F, "Comparison of directly measured to derived polarization imagery using an adaptive signature detection algorithm", *Image and Vision Computing* vol 25, 2007, p1759-1766.

Crosby, F, "Adaptive Correlation Analysis with Non-Overlapping Imagery Indication", *Photogrammetric Engineering and Remote Sensing*, *Photogrammetric Engineering and Remote Sensing* vol 73, No. 9, Sept 2007, pp 1041-1048.

Crosby, F, "Signature Adaptive Target Detection and Threshold Selection for a Constant False Alarm Rate", *Journal of Electronic Imaging*, vol. 14, No. 3, 2005.

Crosby, F. "Geometric Correction through Complex Interpolation", *IEEE International Conference on Image Processing*, Sept. 2002.

Crosby, F. and P. Nelson, "A Sequential Approach to Three-Dimensional Geometric Image Correction", *Proceedings of the SPIE Conference on Medical Imaging* **4684**, Feb. 2002.

GENERAL CONFERENCE PUBLICATIONS

Crosby, F, "Stokes Vector Component Versus Elementary Factor Performance in a Target Detection Algorithm", *Proceedings of the SPIE Conference on Polarization: Measurement, Analysis, and Remote Sensing*, April 2004.

Crosby, F, "Real-Time Multispectral Video Registration", *Proceedings of the SPIE Conference on Detection and Remediation Technologies for Mines and Minelike Targets VIII* April 2004.

Crosby, F. and S. Stetson, "Surface Effect Subtraction for Airborne Underwater Target Detection", *IEEE Oceans '03*.

Crosby, F. et al. "Airborne Testing of the Joint Mine Detection Technology's Tunable Filter Multispectral Camera", *Proceedings of the SPIE Conference on Detection and Remediation Technologies for Mines and Minelike Targets VII* **4742**, April 2002.

Crosby, F. and H. Suiter, "Background Adaptive Band Selection in a Fixed Filter System", *Proceedings of the SPIE Conference on Detection and Remediation Technologies for Mines and Minelike Targets VII* **4742**, April 2002.

Crosby, F. "Glint Induced False Alarm Reduction in Signature Adaptive Target Detection", *Proceedings of the SPIE Conference on Automatic Target Recognition XII* **4726**. April, 2002.

Crosby, F. et al. "Laser Diode Arrays for Expanded Mine Detection Capability", *Proceedings of the SPIE Conference on Detection and Remediation Technologies for Mines and Minelike Targets VII* **4742**, April 2002.

Crosby, F. and S. Riley, "Signature Adaptive Mine Detection at a Constant False Alarm Rate", *Proceedings of the SPIE Conference on Automatic Target Recognition VI* **4379**, April, 2001

Crosby, F., et al. "Background Adaptive Multispectral Band Selection", *Proceedings of the SPIE Conference on Detection and Remediation Technologies for Mines and Minelike Targets VI* **4394**, April, 2001.