
Overview

Electrical Engineer with 15 years experience in US Naval defense industry, specializing in digital signal processing, state-space analysis of dynamic motion models, contact tracking, and array signal processing. Currently holding a U.S. Government security clearance of level SECRET.

Education

University of Massachusetts Dartmouth ▪ Dartmouth, MA ▪ 2009 - 2013

- **Doctor of Philosophy – Electrical Engineering** (GPA 3.75) – Dissertation Title : *Applications and Extensions of Deterministic Expected Likelihood*

University of Massachusetts Dartmouth ▪ Dartmouth, MA ▪ 2006 – 2009

- **Master of Science – Electrical Engineering** (GPA: 3.667)

University of Massachusetts Dartmouth ▪ Dartmouth, MA ▪ 2000 – 2005

- **Bachelor of Science – Electrical Engineering** (GPA: 3.642)

For a listing of current research please visit www.tnorthardt.com

Professional Experience

Program Manager Level 1 and Technical Project Lead, MIKEL Inc. 06/13 – Present

This role was performed for the RSS and ACMS program listed below. The major contributions of this role were:

- *Customer interface.* This includes meeting regularly with the project customers, presenting project status material, and adapting to customer needs.
- *Technical direction.* This includes collaborative team technical decision making as well as direct technical instruction on all major project tasks.
- *Administrative team organization.* This includes employee hour tracking, preparing weekly team status meetings, preparing project schedules and milestones for higher management, and composing technical status reports.
- *Subcontractor interface.* This includes finding and tasking appropriate subcontractors to perform necessary work for the project, tracking their progress, and ensuring they meet necessary deadlines.
- *Financial tracking.* This includes exposure to project financial planning as a function of needed resources and necessary project tasks. This also includes tracking and verifying employee allocation throughout the life of the project.

Electrical Engineer IV, MIKEL Inc. 06/04 – Present

Major Programs of Contribution

- 1) RSS, Reconstruction Software Suite
 - Post-event exercise platform reconstruction algorithm development for NUWC Code 15
 - Developed range-only and bearings-only Kalman Smoother for reconstruction tie-point use
 - Acoustic path propagation modeling for non-flat ocean bottoms for depression/elevation angle estimation
 - Developed GUI for observing acoustic environment and supported paths written in MATLAB
- 2) ACMS, Advanced Contact Management
 - Acoustic path propagation modeling for non-flat ocean bottoms. Path model used to provide lookup-table for matched-field target tracking
 - Developed area-of-uncertainty model for non-statistical target tracking approaches based on observable perturbations and maximum observable gradient direction
 - Developed end-to-end simulation to provide ACMS test and evaluation data. The components of the simulator were a) a dynamic target model for moving simulated targets in a Cartesian coordinate space, b) an acoustic signal propagation model from the targets to the receiving array, and c) necessary array signal processing methods to provide target measurement information.
 - Contributed largely to the development of the ACMS Graphical User Interface written in C, and C++.
- 3) ITA, Improved Torpedo Acquisition
 - Implemented an algorithm to estimate the maximum target solution quality, and time of solution information exhaustion, obtained by Own ship on a single leg.
 - Implemented a Geometric Dilution Of Precision-based (GDOP) maneuver recommendation for Own ship.
 - Developed several methods for determining range accuracy from a Bearings-Only Parameter Evaluation Plot (BO-PEP) by density function marginalization.
- 4) MTS, Minefield Training System
 - Development and design of the signal processor used in the Minefield Training System (MTS) to process DPSK acoustic signals on legacy submarine hydrophones.

- Designed and constructed a software real-time data collection process which collects real-time range measurements from the signal processor with heading, speed, and depth information to be used in ROPA.
 - Designed analysis tools which use the ROPA submarine position and mine locations to score submarine crew performance in mine avoidance.
 - Implemented a Range-Only Direct-Search (RODS) algorithm to estimate an initial bearing, final bearing, and ocean current velocity components.
- 5) TREDS, Tactical Readiness Evaluation and Debrief System
- Contributed to the design, analysis, and maintenance of the MATLAB toolbox titled TREDS used to train submarine operators for tactical readiness and proficiency. This toolbox receives combat system solutions and ground truth information during training sessions and displays this data in real-time. Analysis displays were used to score the accuracy of several parameters; range, bearing, and target correlation.

Residential Computer Consultant and Network Administration, University of Massachusetts 09/00 – 05/04

- Configured university student residents for the university network.
- Provided software and hardware support for university residents.
- Installed and managed network components of the residential university network.

Technical Skills

Algorithm Development: Contact state estimation, acoustic ray propagation, contact state uncertainty regions, sonar data fusion, RF-based precise relative positioning, DNA copy number estimation

Hardware Development: PCB, Analog-to-digital conversion

Operating Systems: Windows Server, Windows XP/2000/98/95, Linux, (Fedora, Redhat, Ubuntu, CENTOS)

Software Development: C, C++, Java, Visual Studio 2008, Netbeans, CVS/SVN

Other software: MS Office, Norton Ghost

Publications

- [1] I. Bilik, T. Northardt, Y. Abramovich, "Expected likelihood for compressive sensing-based DOA estimation", *IET conference on radar systems*, Glasgow, UK, 2012.
- [2] T. Northardt, I. Bilik, Y. Abramovich, "Spatial Compressive Sensing for Direction-of-Arrival Estimation with Bias Mitigation via Expected Likelihood", *IEEE Transactions on Signal Processing*, vol. 61, March 2013.
- [3] T. Northardt, I. Bilik, Y. Abramovich, "Bearings-Only Constant Velocity Target Maneuver Detection via Expected Likelihood," *IEEE Transactions on Aerospace and Electronics Systems*, vol. 50, October, 2014.
- [4] T. Northardt, "An approach for automated passive sonar contact localization", *IEEE Underwater Signal Processing Workgroup*, Rhode Island, 2015.
- [5] T. Northardt, D. Kasilingam, "Spectral extrapolation for super-resolution tumor localization in the breast," *Biomedical Engineering Letters*, 7(1), 25-30, 2017.
- [6] T. Northardt, "Use of Basis Pursuit to detect weak sources among known strong interferes," *IEEE UASP Workshop*, Greenwich, RI, October 2017.
- [7] T. Northardt, S. Nardone "Track-Before-Detect Bearings-Only Localization Performance in Complex Passive Sonar Scenarios: A Case Study," *Submitted to IEEE Journal of Oceanic Engineering*, September 2017.
- [8] T. Northardt, Array Element Signal Estimation For Non-Linear Sensor Array Fault Resiliency," *Submitted to IEEE Journal of Signal Processing*, December 2017.

Reviewed Journals

IET
 IEEE Transactions on Aerospace and Electronic System
 IEEE Transactions on Signal Processing
 Information Fusion Conference (Fusion 2015, 2016)

Professional Memberships

NDIA
 SENEDIA
 Industrial Advisory Board to the University of Massachusetts Dartmouth
 Industrial Advisory Board to Blue Hills Regional Vocational Technical High School

Awards Received

2018 AFCEA 40 Under 40: *An annual award recognition to 40 engineering professionals who have demonstrated a significant STEM contribution*

2018 Rhode Island
 Wavemaker Fellowship *A 2 year fellowship sponsored by Rhode Island for STEM professionals*