

# Department of the Navy SBIR/STTR Success Stories



Small Business Innovation Research/Small Business Technology Transfer



*T*hanks to all the companies for their participation in this  
Navy SBIR/STTR Success Story publication.

We appreciate the time and effort it took to compile  
and share facts, details, and graphics for the stories.

For more information about this publication or additional copies, please contact:

**Office of Naval Research**  
ONR 364, SBIR/STTR Program  
800 North Quincy Street  
Arlington, VA 22217-5660  
[www.onr.navy.mil/sbir](http://www.onr.navy.mil/sbir)

# Department of the Navy SBIR/STTR Success Stories

*Small Business Innovation Research/Small Business Technology Transfer*





*Dedicated to*



**VINCENT D. SCHAPER**

*for his exemplary contribution and service to the Navy*

*and to American Small Businesses*

*as the Navy SBIR Program Manager*

*from 1988 to 2004.*

*All of your associates, colleagues and friends thank you,*

*and wish you well in your retirement.*





## Foreword

US small businesses provide innovative ideas and create many of the new technologies which drive the capabilities the Navy is seeking to maintain and modernize the naval fleet. The Navy's SBIR/STTR program is primarily a mission oriented program which affords companies the opportunity to become part of the national technology base that can feed both the military and private sectors of the nation. The goal is to transition the small business research into active naval systems. This is extremely difficult to accomplish. On the government side, priorities change, program funding evaporates, champions leave and funding for critical demonstrations may be hard to obtain. On the small business side, companies vary in their understanding of Navy protocols, in their ability to develop relationships with customers, in their potential to ultimately deliver products and in their understanding of the role that prime contractors play in the process.

This Navy SBIR/STTR Success Stories publication highlights a few of the many small businesses that have overcome the transition hurdles and made contributions to the military and private sector. These stories exemplify the value of the SBIR/STTR program and provide concrete examples of how small businesses have not only addressed the research and development needs of the government, but they have transitioned that technology into naval systems. It is essential that DoD acquisition offices, military prime contractors, and private industry continue to partner with small businesses and tap their reservoir of expertise, knowledge and ideas to create cutting-edge technologies, products, and processes for the next generation.

JAY M. COHEN  
Rear Admiral, US Navy  
Chief of Naval Research

# Table of Contents

Dedication.....	III
Letter from the Admiral.....	V
Introduction.....	VIII
Phase III Navy Contracts.....	X



21st Century Systems, Inc.....	1
Applied Hydro-Acoustics Research, Inc.....	2
Applied Ordnance Technology, Inc.....	3
Areté Associates .....	4
Argon Engineering Associates, Inc.....	5
ATK Composites (formerly Composite Optics, Inc.).....	6
Bodkin Design & Engineering, LLC.....	7
Coherent Technologies, Inc.....	8
Combustion Research and Flow Technology (CRAFT Tech).....	9
Diversified Technologies, Inc.....	10
EIC Laboratories, Inc.....	11
HYPRES, Inc.....	12
Innovative Technology Associates.....	13
Makai Ocean Engineering, Inc.....	14
Materials Systems Inc.....	15
Mathtech, Inc.....	16
Multispectral Solutions, Inc.....	17

# Table of Contents

Native American Technologies Company.....	18
Navmar Applied Sciences Corp.....	19
nGimat Company (formerly MicroCoating Technologies).....	20
Noesis, Inc.....	21
Nova Engineering, Inc.....	22
Ocean Power Technologies, Inc.....	23
Page Automated Telecommunications Systems, Inc.....	24
Phoenix Integration.....	25
Phoenix Science & Technology, Inc.....	26
Physical Sciences, Inc.....	27
Planning Systems, Inc.....	28
Progeny Systems Corp.....	29
PROMIA, Inc.....	30
Scientific Research Corp.....	31
Smiths Detection - Pasadena (formerly Cyrano Sciences, Inc.).....	32
Stottler Henke Associates, Inc.....	33
ThermoAnalytics, Inc.....	34
Touchstone Research Laboratory.....	35
Zeger-Abrams Inc.....	36
<b>Navy SBIR/STTR Program Points of Contact.....</b>	<b>37</b>
<b>Index of Success Stories by Command.....</b>	<b>39</b>



## The Department of Navy's SBIR/STTR Program

The SBIR Program was established by Congress to provide funding for small businesses to help facilitate technological innovation and to meet the research and development needs of the Federal government.

Since its inception in 1982, the SBIR Program has become one of the most effective technology development programs in the government and has earned the respect of those in the scientific, small business, and academic communities across the nation. Federal agencies that participate in the SBIR/STTR program report that the program has had a positive impact on their agencies' research program. The program's ability to help advance technology and propel economic growth has been cited in studies by the General Accounting Office and recognized by the Small Business Administration.

The Small Business Technology Transfer Program (STTR) was established in 1992 and is modeled and essentially executed in the same manner as the SBIR Program. Both programs involve small businesses with fewer than 500 employees that are engaged in federal research and development (R&D). The STTR Program is designed for companies to partner with researchers at not for profit research institutes, contractor-operated federally-funded R&D centers, or universities. Companies and research partners work as a team to turn ideas into technologies or products for the Naval Fleet.

The Navy's SBIR/STTR program is a highly competitive three-phase process that funds science and technology areas identified by the acquisition community that will enhance warfighting capabilities through innovations developed by small businesses. In order to increase the likelihood that the Department of Navy realizes a return on its SBIR/STTR investment in the form of products, processes, or services, it established the Transition Assistance Program (TAP). TAP works with Phase II companies to help them conduct preliminary strategic planning and assist with the marketing of their products to Navy and DoD program managers.

### Navy SBIR/STTR Three Phase Program

**Phase I** determines the scientific and technical merit, the feasibility of the proposed innovation, and the quality of the small business' performance. This phase may also support small scale testing. Base awards are typically \$70,000 with a \$30,000 option that may be exercised if the project is selected for continuation into Phase II. The option bridges the gap between Phase I and Phase II awards. Phase I typically lasts six months and the option may extend the effort for an additional three months (see the current solicitation for specific details).

**Phase II** continues the Phase I effort and demonstrates the theory by building and testing a prototype. Base awards are typically \$450,000 to \$1,000,000 and may include options that can be exercised if the project shows strong Phase III transition potential. This phase typically lasts 24 months.

**Phase III** transitions the technology or product into a DoD application. Production or additional research and development efforts are supported by DoD, the Federal Government, defense prime contractors, or the private sector. The company can receive either government or private sector funds, but no longer receives SBIR/STTR funding.

The success of the Navy's SBIR/STTR program is measured by the companies that transition their concepts into products, tools, or services that benefit the Navy acquisition community. The Navy's program has achieved the highest rate of transitioning technology back to the military of any DoD agency as evidenced by the data collected by DoD and shown in chart 1. The list of Phase III Navy contracts which are included in that data is shown on the following page. Expect to see these companies reported in future success editions.

The **companies included in this Navy Success publication** have all reached the Phase III level of the SBIR/STTR program. For each story, we have tried to describe:

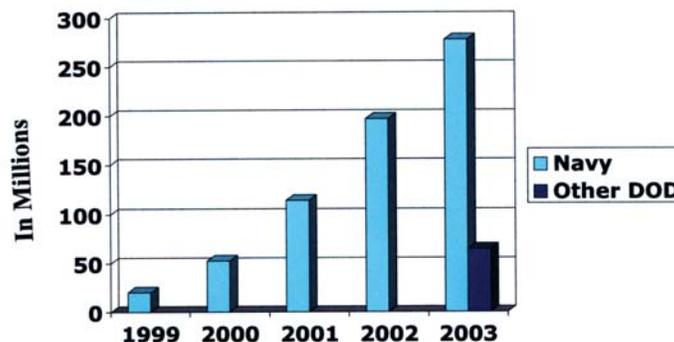
- The technology developed by the small business
  - The military and commercial significance of the technology
  - The application of the technology
  - Additional information about the company
  - A description of the SBIR/STTR investment and follow-on revenues
- **SBIR/STTR Investment** – the dollar amount the SBIR/STTR program invested in the company to develop the technology
  - **Project Revenue** – non-SBIR/STTR dollars that were invested in the company for additional research and development or the result of product sales, i.e. Phase III.

If you would like to know more about the SBIR/STTR program, identify the latest technology advances, or participate in the SBIR/STTR solicitation, please visit our website at <http://www.onr.navy.mil/sbir> or contact one of the Navy program managers listed in the back of this publication.

### CHART 1

#### Navy has the best record, relative to others in DoD, for Transitioning SBIR's and STTR's into DoD funded Phase III awards

#### SBIR/STTR DoD Phase III Contracts Funding from OSD DD-350 Reports



- DD-350 report for other DoD services available for FY 03 only
- Total FY 03 DoD Phase III funding was \$342 M, Navy was \$277.5
- In 03, Navy received 22% of SBIR/STTR funding but obtained 81% of Phase III dollars

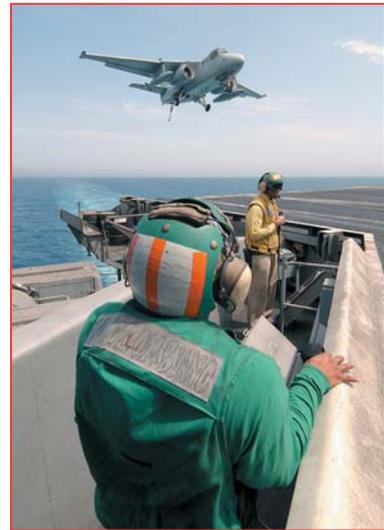
# Phase III Navy Contracts

PHASE II SYSCOM	TOPIC NUMBER	COMPANY NAME	PHASE III SPONSOR	CONTRACT	\$ OBLIGATED IN FY03
MARCOR	N99-037	ARETE ASSOCIATES	ONR (FNC/EFV)	N0001403C0301	\$ 2,676,000
MARCOR	CBD02-203	CYRANO SCIENCES, INC.	MCSC (AAAV)	M6700403C0018	\$ 2,999,365
MARCOR	A96-032	OPTICAL AIR DATA SYSTEMS LP	MARCOR	M6700403C0013	\$ 12,362,629
MARCOR	N99-200	SARA INC	MCSC (AAAV)	M6785403C1018	\$ 599,959
					<b>\$ 18,637,953</b>
NAVAIR	N00-013	APPLIED HYDRO-ACOUSTICS RESEARCH	NAVAIR	N6833502D0022	\$ 516,956
NAVAIR	N90-074	ATK MISSILE SYSTEMS COMPANY	NAVAIR	N0001903C0353	\$ 29,000,000
NAVAIR	N99-180	BARRON ASSOCIATES	NAVAIR	N6833503D0097	\$ 199,996
NAVAIR	N00-099	COMPOSITE OPTICS	NAVAIR	N6833503D0104	\$ 4,441,672
NAVAIR	AF93-158	CPU TECHNOLOGY, INC	NAVAIR PAX	N0042101D0300	\$ 6,676,087
NAVAIR	N03-008; N03-009	DIGITAL SYSTEM RESOURCES, INC	NAVAIR	N6833503D0105	\$ 163,890
NAVAIR	N98-043	ESSEX CORPORATION	NAWCLakehurst	N6833502D0009	\$ 3,341,540
NAVAIR	N93-250; N96-020	FOSTER-MILLER	NAWCLakehurst	N6833503D0145	\$ 4,200,000
NAVAIR	N01-010	INDIGO SYSTEMS CORP	NAVAIR	N6833503D0001	\$ 750,000
NAVAIR	N90-264	ISERA GROUP, LLC	NAWCTSD	N6133997D0006	\$ 3,008,087
NAVAIR	N92-136	ISOTHERMAL SYSTEMS RESEARCH	NAVAIR	N6833503D0149	\$ 29,355
NAVAIR	N90-085	LOGIS-TECH, INC.	NAWCLakehurst	N6833501D0096	\$ 599,108
NAVAIR	N98-149	MATERIALS RESEARCH & DESIGN, INC.	NAWCLakehurst	N6833502D0027	\$ 751,071
NAVAIR	N92-170	NAVMAR APPLIED SCIENCES CORP	NAWCLakehurst	N6833500D0396	\$ 13,004,518
NAVAIR	N91-346	OPTICS 1, INC.	NAWCLakehurst	N6833501D0293	\$ 3,918,000
NAVAIR	N99-053	PHYSICAL SCIENCES	PMS-378	N6833503D0099	\$ 699,240
NAVAIR	N96-209	POLATOMIC INC	NAWCLakehurst	N6833501D0237	\$ 1,569,828
NAVAIR	N95-014	RDA INC	NAVAIR PAX	N0042199C1072	\$ 2,829,560
NAVAIR	N90-074	SCIENCE & APPLIED TECHNOLOGY	NAVAIR PAX	N00019940078	
NAVAIR	N99-068	TECHNOLOGY SERVICE CORP	NAWCLakehurst	N0001902C3010	\$ 12,246,509
NAVAIR	N99-193	TOYON RESEARCH	NAVAIR	N6833503D0098	\$ 429,704
NAVAIR, NAVSEA	N99-054	MSE TECHNOLOGY APPLICATIONS	PMA-251	N6833503D0147	\$ 49,863
				Expected 4/04	\$1.5 (Apr '04)
					<b>\$ 88,424,984</b>
NAVSEA	N99-198	21st CENTURY SYSTEMS, INC.	PEO IWS	N0017803C3130	\$ 3,017,700
NAVSEA	N98-106	ADVANCED ACOUSTIC CONCEPTS	NUWC	N6660401D4218	\$ 3,516,805
NAVSEA	N97-090 N92-077	ADVANCED ACOUSTIC CONCEPTS ADVANCED OPTICAL SYSTEMS	NAVSEA	N0002402C6311	\$ 15,401,672
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	NSWC DAHLGREN	N0017899C3018	\$ 250,000
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	NSWC DAHLGREN	N0017800D3052	\$ 5,285,701
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	NSWC		
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	CARDEROCK	N0016700D0097	\$ 6,562,185
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	NSWC CRANE	N0016401C0048	\$ 3,473,473
NAVSEA	N98-114	AEPTec MICROSYSTEMS, INC.	NAVSEA	N0024401D0036	\$ 20,686,319
NAVSEA	N96-268	APPLIED ORDNANCE TECHNOLOGY APPLIED HYDRO-ACOUSTICS RESEARCH	NAVSEA	N0002403C4020	\$ 4,768,396
NAVSEA	N99-224	RESEARCH	NAVSEA	N0002403C6302	\$ 3,810,198
NAVSEA	N96-071	AVINEON, INC.	NAVSEA	N0002403C4049	\$ 699,498

# Phase III Navy Contracts

PHASE II SYSCOM	TOPIC NUMBER	COMPANY NAME	PHASE III SPONSOR	CONTRACT	\$ OBLIGATED IN FY03
NAVSEA	Multiple Topics	CHESAPEAKE SCIENCES CORPORATION	NAVSEA	N0002400C6230	\$ 5,089,298
NAVSEA	N93-084	DANIEL WAGNER	NSWC DAHLGREN	N0017898D3009	\$ 179,994
NAVSEA	N94-203; N99-110	DARLINGTON, INC	SPAWAR	N6600103D7000	\$ 2,470,384
NAVSEA	N93-027	MALIBU RESEARCH ASSOC. INC.	NSWC DAHLGREN	N0017802C3085	\$ 1,087,324
NAVSEA	N01-077	MAYFLOWER COMMUNICATIONS CO.	NSWC DAHLGREN	N0017802C1053	\$ 997,901
NAVSEA	N92-076	PHYSICS, MATHEMATICS, & COMPUTERS	NSWC DAHLGREN		\$ 634,642
NAVSEA	N98-128	PLANNING SYSTEMS INC.	PMS262	N0017898D1063	
NAVSEA	N00-049	PROGENY SYSTEMS CORPORATION	PMS 4012B	N0002403R6227	\$ 2,100,000
NAVSEA	N98-122	PROGENY SYSTEMS CORPORATION	PMS425	N0002403C6219	\$ 5,034,794
NAVSEA	N96-278; N98-115	PROGENY SYSTEMS CORPORATION	PMS425	N0002403C6201	\$ 6,384,126
NAVSEA	N98-077; N98-072	PROGENY SYSTEMS CORPORATION	PMS450/PMS425	N0002404C6201	\$ 1,391,351
NAVSEA	N98-077; N98-072	SOLIPSYS CORPORATION	NAVSEA	N0002402C5108	\$ 7,880,000
NAVSEA	N92-095	TPL, INCORPORATED	NSWC CRANE	N0016401C4701	\$ 931,181
NAVSEA	N93-101	TRIDENT SYSTEMS, INC.	NSWC DAHLGREN	N0017800D3007	\$ 5,685,873
NAVSEA	N99-144	TRITON SYSTEMS	NSWC DAHLGREN	N0017803D1014	\$ 349,447
NAVSEA, NAVAIR	Multiple Topics	DIGITAL SYSTEM RESOURCES, INC	NAVSEA, NAVAIR	NUMEROUS	\$ 40,735,591
					\$ 148,423,853
ONR	N97-067	ADVANCED CERAMICS RESEARCH, IN	ONR	N0001403C0329	\$ 2,039,920
ONR	N02-T015	ADVANCED CERAMICS RESEARCH, IN	ONR	N0001403D0247	\$ 2,821,652
ONR	Multiple Topics	DIGITAL SYSTEM RESOURCES, INC	ONR	N0001401D0225	\$ 3,598,654
ONR	N00-T001	HYPRES, INC	ONR	N0001403C0370	\$ 7,979,860
ONR	N95-074	OCEAN POWER TECHNOLOGIES INC	ONR	N0001402C0053	\$ 1,362,349
ONR	N98-136; N00-112	ORINCON DEFENSE	NAVAIR PAX	N0042102D3063	\$ 6,999,989
ONR	N02-112	POLATOMIC INC	ONR	N0001403C0499	\$ 250,000
ONR	N99-025	SCENPRO, INC	ONR	N0001403C0257	\$ 455,145
ONR	OSD98-043	TOUCHSTONE RESEARCH LAB LTD	ONR	N0001402C0392	\$ 2,269,602
ONR	N01-T001;N00-113	WEBB RESEARCH CORP	ONR	N0001403C0441	\$ 293,987
ONR NAVAIR	N90-064; N96-209; N02-198	POLATOMIC INC	ONR	N0001403C0388	\$ 950,297
					\$ 29,021,455
SPAWAR	N94-203	DARLINGTON, INC	SPAWAR	N6523699D5831	\$ 6,869,354
SPAWAR	N99-167	PROMIA INCORPORATED	SPAWAR	N0003901C3167	\$ 4,274,988
SPAWAR	N99-172	SCIENTIFIC RESEARCH CORPORATION	SPAWAR	N0003903C0011	\$ 497,095
SPAWAR	Multiple Topics	VIASAT, INCORPORATED	SPAWAR	N6600199D7000	\$ 3,219,500
					\$ 14,860,937
					\$ 299,369,182





## ***The Success Stories***



## Advanced Battle Station with Decision Support System

### ABOUT THE TECHNOLOGY

The Advanced Battlestation with Decision Support System (ABS/DSS), created by 21st Century Systems, Inc. (21CSI) uses intelligent agent-based software technology to provide a fused battlespace view and decision support for carrier Combat Direction Center (CDC) warfighters. In conjunction with advanced visualization techniques, the intelligent agent-based software combines, correlates, and fuses data from disparate sources, as well as offers viable tactical options to the warfighter in near-real time. The ABS/DSS provides the warfighter with integrated battlespace awareness and the ability to tailor an operational picture to specific mission needs. As a result, ABS/DSS is able to prioritize and re-configure the battle picture to display the tactical information in a manner more easily understood and more quickly absorbed by combat watchstanders.

### MILITARY & COMMERCIAL SIGNIFICANCE

21CSI's DSS tools have wide-ranging applicability across warfare and operational user domains. ABS/DSS functions as a fully interactive system that presents relevant information when needed, where needed, and in the form needed. The warfighter gains in situational awareness through exploration of the integrated air, ground, maritime, and subsurface environments of the battlespace. ABS/DSS significantly contributes to the reduction in carrier CDC manning requirements.



ABS DSS Screen Capture

### APPLICATIONS

- Multiple carrier combat system suites, including the Aircraft Carrier Tactical Support Center, Advanced Combat Directional System and Ship Self Defense System

### ABOUT THE COMPANY

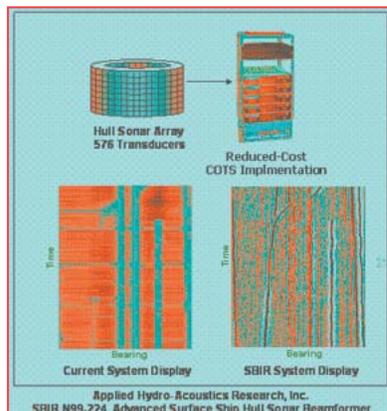
Founded in April 1996, 21st Century Systems, Inc. has pioneered intelligent agent-based real-time decision support systems for human decision makers operating mission-and life-critical applications. A number of 21CSI's tool components and systems have reached maturity and are now transitioning into stable, IT-21, DII-COE and otherwise software standard-compliant products. The AEDGE® (Agent Enhanced Decision Guide Environment) decision support software, developed by 21CSI, is a modular "toolkit" that provides the technical underpinnings for 21CSI's ability to rapidly prototype new applications for the Navy. AEDGE® is one of 21CSI's pioneer next generation commercially off-the-shelf products.

Topic Number: N99-118 (NAVSEA)  
SBIR Investment: \$1M  
Project Revenue: \$6.1M

21st Century Systems, Inc.  
6825 Pine Street, Suite 101  
Omaha, NE 68106  
(402) 505-7884  
www.21csi.com  
david.andersen@21csi.com  
David Andersen



## Advanced Concepts in Hull Array Beamforming



Advanced Surface Ship Hull Sonar Beamformer

### ABOUT THE TECHNOLOGY

Applied Hydro-Acoustics Research, Inc. (AHA) has developed a new sonar beamforming technique for the Navy surface combatant hull-mounted array. The technique consists of a new method for adaptive beamformer (ABF). The Short-Time Adaptive Broadband Beamformer (STABB) algorithm differs from traditional ABF techniques by operating over a broad frequency range and having the ability to rapidly respond to changes in the acoustic noise field. The rapid adaptation characteristic enhances performance in the face of active reverberation and close-aboard fast moving targets.

### MILITARY & COMMERCIAL SIGNIFICANCE

AHA's new ABF technology and commercial off the shelf implementation improves anti-submarine warfare (ASW) sonar performance and lowers operating cost. Maintenance expenditures are reduced due to the use of lower-cost symmetric-multiprocessor server hardware and the need for fewer replaceable components. The algorithm significantly increases the ship's sonar performance while the active sonar is in use and when operating in noisy acoustic environments. The technology raises hull array sonar gain, yields more accurate sonar target bearings, and increases target detection range and target holding time. It achieves better performance in automated active classification and tracking systems, and more robust performance in littoral water regions. The beamformer computing environment reduces system procurement and life-cycle maintenance cost of commercial Intel symmetric multi-processor servers, and substantially reduces the procurement cost of systems, in comparison to those procured in earlier years. Benefits of the ABF technology are applicable for towed array sonars, sonobuoy active receivers, and multi-static systems.

### APPLICATIONS

- NAVSEA PEO-IWS5 -AN/SQQ-89: Surface Ship USW Combat System
- Naval Surface Weapons Center/ Carderock: Noise Source Localization Analysis
- Workstation
- Towed array sonar
- Sonobuoy active receivers, multi-static systems

### ABOUT THE COMPANY

Applied Hydro-Acoustics Research, Inc. (AHA), founded in 1972, is a privately owned defense contractor that addresses critical US Navy ASW needs. AHA combines systems engineering, software development, testing and evaluation, and installation, to develop innovative sonar software systems solutions. As a leader in real-time ASW system prototyping, AHA performs advanced research and implements unique, inventive solutions in the areas of sonar/acoustics beamforming, signal processing, modeling and simulation, and tactical decision aid development. Under the Navy SBIR program, AHA's annual sales in sonar have increased 200%. AHA is currently the beamformer functional segment developer and integrator, for three current surface ship sonar development and production programs. The technology is also used by NSWC-Carderock to provide an improved noise source localization capability.

Applied Hydro-Acoustics Research, Inc (AHA)  
5885 Trinity Parkway, Suite 230  
Centreville, VA 20120  
(703) 968-8040  
www.aharinc.com  
llew@aharinc.com  
Llew Wood

Topic Number: N99-224 (NAVSEA)  
SBIR Investment: \$986K  
Project Revenue: \$3.71M

## Advanced Modular Gun Design

### ABOUT THE TECHNOLOGY

Applied Ordnance Technology (AOT) has developed a high velocity, high pressure, large caliber test gun that incorporates a separable chamber using AOT's "eXtended Long Range" (XLR) gun design. AOT's objective is to provide the Navy with the Advanced Modular Gun Demonstrator, a test and evaluation gun based on the XLR design, that is capable of testing advanced gun technologies.

The XLR gun was developed in conjunction with Advanced Power Technology, Inc., and offers an innovative approach to loading, chamber sealing, chamber/barrel connection and recoil. The design consists of a high-velocity, smoothbore gun incorporating multiple separable large-volume chambers and a segmented barrel. The key innovation involves the use of a separable chamber bridged by a single-use chambrage sealing cartridge in a high pressure, large caliber gun. The development of the XLR Gun recently advanced with the successful evaluation of the chambrage sealing cartridge in a sub-scale Proof of Concept test at a 60,000 psi chamber pressure. AOT is currently working on a full-scale, full pressure test to evaluate the separable chamber in a relevant gun environment.

### MILITARY & COMMERCIAL SIGNIFICANCE

DoD programs often require a gun system capable of firing projectiles at ever-increasing velocities and ranges. The versatility of the XLR test gun provides a means to evaluate many different gun subsystems, which helps to facilitate greater advancements in gun technology.



XLR Gun Design

### APPLICATIONS

- DoD gun & gun subsystem evaluation (i.e. advanced projectiles, barrel wear/erosion, materials, propellants, etc)
- Aerospace (NASA) - hypervelocity testing
- Aerospace (Boeing, Lockheed, Pratt & Whitney) - scramjet testing
- Gun (launcher) design enabling industry to launch full caliber projectiles at high speeds

### ABOUT THE COMPANY

Applied Ordnance Technology, Inc. is an employee stock owned engineering and professional support service business. AOT's staff of professional engineering, scientific, technical, and management experts are equipped to design and deliver tailored solutions for a wide range of tasks to a diverse customer base. Through excellent communication and close association with customers, AOT produces superior quality products with top-notch results. Consequently, customers recognize AOT as a leader in the field of engineering and management support services.

Topic Number: N96-268 (NAVSEA)

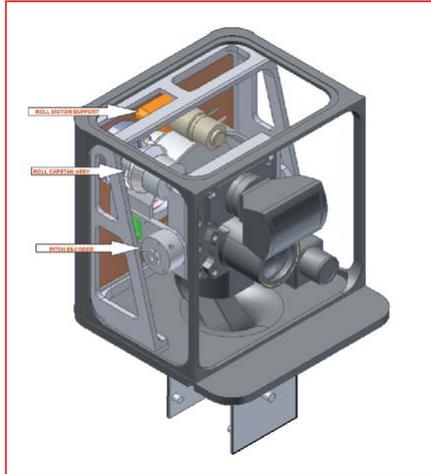
SBIR Investment: \$708K

Project Revenue: \$12.4M

Applied Ordnance Technology, Inc.  
103 Paul Mellon Court  
Waldorf, MD 20602  
(301) 843-4045  
www.aot.com  
corpcomm@aot.com  
Wendy Hornbaker



# Collision Avoidance Systems for the Expeditionary Fighting Vehicle



Optical Layout of the Collision Avoidance Sensor

## APPLICATIONS

- Marine Corp EFV
- High Speed Commercial Watercraft

## ABOUT THE COMPANY

Since its inception in 1976, Areté Associates has grown to a staff of nearly 200 scientific and engineering professionals. Areté Associates has focused on providing comprehensive solutions to a wide array of issues faced by the defense and intelligence communities. The scope of company activities includes requirements analysis, conceptual design, system development, and comprehensive performance assessments.

## ABOUT THE TECHNOLOGY

Enhanced maneuverability in the littorals in the presence of both natural and man-made hazards is an essential requirement for executing the Ship to Objective Maneuver. Maneuverability of the Expeditionary Fighting Vehicle (EFV) can be significantly enhanced by integration of an on-board, real time collision avoidance system (CAS). Areté Associates has demonstrated the utility of a grazing incidence lidar (optical radar) to detect floating obstacles, shallow bottoms, and submerged targets at significant standoff ranges. The CAS will be demonstrated on the EFV.

## MILITARY & COMMERCIAL SIGNIFICANCE

The EFV was developed to be the primary combat vehicle to transport marines across the littoral. Its high-speed water operations provide significantly improved ship-to-shore movement, and allows marines to more effectively implement Operational Maneuvers from the Sea. An essential element of this capability is an integrated CAS that permits the EFV pilot to maneuver through obstacles in shallow water and the surf zone. By leveraging proven grazing incidence lidar technology, the collision avoidance capability will transition to the EFV at the conclusion of the Phase III.



The Expeditionary Fighting Vehicle

Areté Associates  
P.O. Box 6024  
Sherman Oaks, CA 91413  
(520) 571-8660  
www.arete.com  
jmclean@arete.com  
John McLean

Topic Number: N99-037 (MARCOR)  
SBIR Investment: \$850K  
Project Revenue: \$3.2M



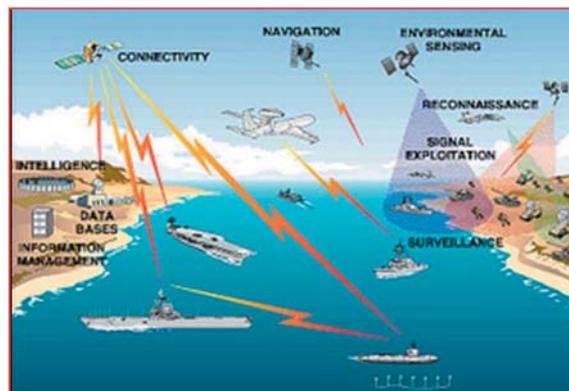
## Sensor Tasking Segment (STS)

### ABOUT THE TECHNOLOGY

Argon Engineering developed an innovative network-centric sensor tasking segment (STS) architecture using thin-tasking clients, server application, and sensor agents for information warfare sensor tasking and management. Argon analyzed the functions of the Cryptologic Resource Coordinator to develop tools for mission planning and resource optimization. The outcome was the universal tasking format using hypertext markup language (XML) to task a host of different cryptologic sensors. A shipboard demonstration of STS using automated mission tasking with network centric publish and subscribe actions was successfully conducted, allowing a remote land-based tasking authority to initiate operation of an at-sea sensor. The tasking process objective is to use spatial and contextual triggers as well as reporting feedback mechanisms to improve mission management of cryptologic resources.

### MILITARY & COMMERCIAL SIGNIFICANCE

Argon Engineering's STS develops a universal signal description file that leverages the best of current and upcoming cryptologic systems. The STS addresses the issue of remotely tasking sophisticated shipboard cryptologic systems. These systems perform indications and warnings, specific signal collection and exploitation, and signal development within the full scope of information warfare. This allows tasking refinements from one cryptologic system to another and facilitates network centric command and control. The STS encompasses the capability to task all major, current and upcoming cryptologic systems for surface, subsurface, airborne, transportable, and fixed site installations. It provides a significant advance in the quality and timeliness of cryptologic intelligence through improvements in the management and adaptability of sensor tasking. STS will be the basis for the core of the next generation cryptologic system tasking and allows the scalability to address the evergrowing sophistication of communication signals and networks.



STS addresses remotely tasking shipboard cryptologic systems

### APPLICATIONS

- Cryptologic unified build/global command and control system-maritime segment for use in U.S. and second party systems
- DoD: tasking sophisticated sensors
- Packaged into utilities and used in areas such as tasking distribution, resource optimization, exploitation optimization and feedback dissemination

### ABOUT THE COMPANY

Argon Engineering is a rapidly growing systems engineering and development company providing full service information solutions to a wide range of customers. The business vision is to grow by providing unique state-of-the-art technology solutions to difficult system problems. Argon currently provides sensor development, data collection and decision support, analysis and design of information retrieval, and visualization techniques.

Topic Number: N00-031 (SPAWAR)

SBIR Investment: \$850K

Project Revenue: \$800K

Argon Engineering Associates, Inc.  
12701 Fair Lakes Circle, Suite 650  
Fairfax, VA 22033-4910  
(703) 995-4242  
www.argoneng.com  
rkellogg@argoneng.com  
Robert L. Kellogg



# High Speed, Dual-Mode Missile Radome (HiSMR)



High Temperature, Dual Mode Radome

## APPLICATIONS

- High Speed, Dual-Mode Missile Radome (HiSMR)
- Weapons and Unmanned Air Vehicles
- AGM-88E Advanced Anti-Radiation Guided Missile (AARGM)
- Space launch and re-entry vehicles
- Jet engine exhaust nozzle flaps for both conventional jet engines & thrust vectoring engines
- Exhaust system components for helicopters
- Combustor liners for advanced gas turbine engines

## ABOUT THE COMPANY

Composite Optics, Inc. doing business as ATK Composites, is a provider of advanced composite products for the space and aerospace markets. With over 27 years of space flight heritage in the design, manufacture and test of successful programs for customers around the globe, ATK Composites is recognized as a world leader. Its expertise covers a wide array of complementary disciplines and products, including antennas, ceramics, materials, structures, and instruments. The development of innovative new technologies and applications in these areas provides fuel for ATK Composites' continued growth as the space and aerospace markets undergo change. As a result of the progress made in developing CMCs for High Speed Missile Radome applications, ATK Composites has attracted interest from DoD and major prime contractors for several strategic applications, including the Missile Defense and Precision Global Strike Initiatives. This increased interest from DoD should result in a 5 to 10% increase in sales and as much as a 10% increase in personnel.

## ABOUT THE TECHNOLOGY

As the Navy continues to make communications advancements, antenna bandwidth requirements increase. With the use of higher frequencies and higher missile speeds, the housing of the antenna, called the radome, must meet new materials challenges. The radome must maintain mechanical and electrical properties at higher temperatures. ATK Composites has developed Ceramic Matrix Composite (CMC) materials that show an excellent combination of electrical, mechanical, and erosion-resistance properties suitable for radome structures that can experience temperatures up to 2500°F.

## MILITARY & COMMERCIAL SIGNIFICANCE

CMCs show great promise for achieving a successful high temperature, high frequency nose radome suitable for high speed missiles. CMC materials for high temperature antennas and radomes will be of great value on current and future commercial space launch and re-entry vehicles. The antennae and radomes on these vehicles (manned and unmanned) reach temperatures that exceed the capabilities of most available materials systems and must meet difficult dielectric and physical demands. The extended durability and increased performance of CMC components decreases the life cycle costs of commercial jet engines, exhaust system components, and commercial power gas turbine engines. ATK Composites is partnering with Siemens-Westinghouse to apply CMCs to their next-generation engine product lines.

**ATK Composites**  
**9617 Distribution Avenue**  
**San Diego, CA 92121-2393**  
**(858) 621-5791**  
**www.atk.com**  
**keith.loss@atk.com**  
**Keith Loss**

**Topic Number: N00-099 (NAVAIR)**  
**SBIR Investment: \$70K**  
**Project Revenue: \$780K**

# Low-cost Lightweight, Night Vision Capability for Hand Launched UAV System

## ABOUT THE TECHNOLOGY

Bodkin Design & Engineering, LLC (BD&E) developed the world's first miniature uncooled infrared camera. The Infrared Microcam provides high-resolution thermal images that equal those available from costly cryogenically cooled cameras. The lightweight sensor head (3" x 3.9" x 3.2" weighing 7.0 oz.) uses a high resolution (320 x 240 pixel) uncooled focal plane array. This microbolometer array operates at room temperature, eliminating thermal stress, and the cooler's power drain. The camera has no moving parts, making it highly reliable and compact. Its patented tethered sensor head permits it to be placed in smaller spaces than previously possible, thereby enabling new applications for thermal imaging.

Designed for and demonstrated on the Hand-Launched Pointer UAV (Unmanned Aerial Vehicles), the camera's compact rugged design, low power drain (4.5 watts), and wide operating temperature range (-20 to 60 °C.) enables its use across a wide range of demanding environments. The highly sensitive camera responds to temperature differences smaller than 0.1 °C, and captures video like imagery at high frame rates (30Hz) without blooming, blurring, or trails. BD&E's Infrared Microcam has become an integral part of the Pointer UAV system.

## MILITARY & COMMERCIAL SIGNIFICANCE

The miniature UAV reconnaissance system provides the field commander with real-time video imagery. The infrared technology enables camouflage penetrating imagery during both day and night operations. The UAV camera supplies crucial high resolution thermal images needed to help make time critical strategic decisions. BD&E's Infrared Microcam greatly increases the military's ability to detect and discriminate targets from decoys and background.



Infrared Microcam

## APPLICATIONS

- Cameras for surveillance, missile guidance and UAVs
- Hyperspectral imagers for target discrimination
- Mine detection cameras for soldiers
- Manufacturing process monitoring, non-destructive inspection/testing
- Power distribution inspection
- Border surveillance cameras for homeland security
- Thermal viewers for fire fighting

## ABOUT THE COMPANY

Since 1992, Bodkin Design & Engineering, LLC (BD&E) has provided product development, innovation and engineering services to the industrial, commercial, military, and research communities. BD&E has had a prosperous career developing new technologies and devices based partially on the SBIR research program. BD&E formed the Microcam Corporation to manufacture and market the Infrared Microcam. The research and patents were subsequently purchased by its former research partner, Loral Infrared and Imaging Systems (now BAE Systems), and the UAV camera is now an important part of its uncooled business line. The SBIR program helped facilitate the launch of a second company, Ion Optics, which produces spectrally tuned single bolometer detectors and commercial gas analysis instruments.

Topic Number: N94-172 (NAVAIR)

SBIR Investment: \$818K

Project Revenue: \$5.2M

**Bodkin Design & Engineering, LLC**

P.O. Box 81386

Wellesley, MA 02481

(781) 235-6351

[www.bodkindesign.com](http://www.bodkindesign.com)

[wab@bodkindesign.com](mailto:wab@bodkindesign.com)

Andrew Bodkin



## Multiple Mode Noncooperative Hard Target Identification Ladar Systems



Transceiver



Equipment Rack

### APPLICATIONS

- Kill chain prosecution (find, fix, track, target, engage, assess)
- 2D/3D imaging and coherent adaptive doublet waveform vibrometry
- DoD 1.5-micron wavelength laser transmitter for coherent Doppler lidar wind sensing

### ABOUT THE COMPANY

Coherent Technologies, Inc. is a world leader in the development and demonstration of state-of-the-art laser radar technologies. It develops prototype custom systems and manufactures laser radar systems for military and commercial customers. CTI and its commercial products division, CLR Photonics, Inc. (CLR) is a full service company capable of generating new laser-based technology concepts from technology development and demonstration to product engineering and manufacturing. CTI is clearly a SBIR success story. It has leveraged extensive seed support from DoD, NASA, research institutions, and substantial internal investments to develop the product design and manufacturing mechanism necessary to convert technology breadboards to fielded products while maintaining a world class R&D capability.

### ABOUT THE TECHNOLOGY

Coherent Technologies, Inc. (CTI) has developed a new laser source that identifies difficult targets at extended distances. This first-of-its-kind transmitter utilizes innovative 1.5 micron wavelength eyesafe laser technology. The transceiver architecture is best utilized in long range detection and noncooperative target identification (NCTID) via microDoppler vibrometry. An innovative compact diode-pumped solid-state laser is used to drive a coherent injection-seeded solid-state Raman ring resonator that produces adaptive waveforms to optimize sensor performance for a given target. The success of CTI's laser technology has resulted in multiple Air Force follow-on contracts to mature the technology and to provide comprehensive studies for advanced tactical airborne applications.

### MILITARY & COMMERCIAL SIGNIFICANCE

Using sensors to enhance combat identification to improve fratricide avoidance and increase the ability to differentiate non-combatants from forces with hostile intent is of paramount military concern. At extended stand-off ranges, current sensors have difficulty achieving a combination of an operationally safe high probability of detection and a low probability of false alarm. CIT's laser technology provides a new long-range sensor that enables earlier identification of unknown targets in air-to-air engagements. The adaptive doublet pulse format provides superior range performance to continuous wave vibrometers with equivalent power-aperture products, while being uniquely compatible with other NCTID functions for tactical/strategic surveillance. Ancillary functions include precision ranging for trajectory state vector measurement and illumination for shape-echoes or multi-dimensional target images.

**Coherent Technologies, Inc.**  
135 S. Taylor Avenue  
Louisville, CO 80027-3025  
(303) 604-2000  
ctilidar.com  
cti@ctilidar.com  
Duane Smith

**Topic Number: N96-207 (NAVAIR)**  
**SBIR Investment: \$700K**  
**Project Revenue: \$6.9M**

# Aircraft Weapons Bay Flow Simulation Model

## ABOUT THE TECHNOLOGY

An internal aircraft weapons bay, when exposed to freestream flow, experiences an intense aero-acoustic environment in and around the bay with loads as high as 160 to 180 decibel. High acoustic loads significantly reduce the life of aero-structures in the bay and damage sensitive electronic components. These loads disrupt the store separation process by inducing unfavorable moments on the store.

Aircraft design engineers have been challenged to develop innovative suppression methods to control the acoustic environment in the weapons bay. Further, control of the aero-acoustic environment surrounding cavities exposed to high-speed flows has been the subject of several recent investigations. CRAFT Tech has developed a Hybrid Reynolds-Averaged Navier-Stokes Large Eddy Simulation (RANS-LES) model for the prediction of weapons bay aero-acoustics. The technology has aided in the design of control systems to minimize dynamic loading on the weapons bay structures and ensure the safe separation of stores for naval platforms.

## MILITARY & COMMERCIAL SIGNIFICANCE

The flexible Hybrid RANS-LES model enables the development of cost-effective control strategies for achieving successful store separation. It helps reduce the dynamic loading on the exposed weapons bay structures, thereby reducing the risks of fatigue-driven structural failure. The CRAFT Tech Hybrid RANS-LES model benefits any flow modeling efforts within the defense community. The basic technology uses a highly efficient parallel, portable, adaptive unstructured Computational Fluid Dynamics (CFD) framework, which permits the simulation of very complex problems. It predicts modes and amplitudes of oscillations, and models the effect of geometric variations for different aircrafts, without assumptions of simple rectangular bay geometries. The Hybrid RANS-LES provides greater volume and detail of information, and its full scale simulations take the guess work out of the predictions.



Aircraft Weapons Bay Flow Simulation Model

## APPLICATIONS

- Compressible and incompressible flow modules, advanced turbulence modeling, Reynolds Stress Models, Two-Equation Models, Large Eddy Simulation Models, & Hybrid RANS-LES models
- Noise reduction device for integration into the F404/414 engines
- CFD integrated optimization technique for the improvement of stern plane performance
- Analyze transport aircraft plumes; prediction of helicopter exhaust plumes in the presence of rotor downwash
- Moving body problems such as store separation applications

## ABOUT THE COMPANY

Combustion Research and Flow Technology, Inc. was formed in 1994 from a nucleus of personnel with over 30 years of experience in flow modeling. CRAFT Tech provides consulting services and Computational Fluid Dynamics (CFD) software for the analysis and design of propulsive and industrial fluid systems. The company addresses all aspects of fluid analysis, including advanced topics such as turbulence modeling, reacting flow modeling, multi-phase flow modeling, cavitations modeling and cryogenic flow modeling. Concept-to-prototype transitioning is an emerging focus of their activities. The company has successfully transitioned a series of weapons bay related technology funded by the SBIR/STTR Program to a full scale flight test program for acoustic suppression technology demonstration.

Topic Number: N96-192 (NAVAIR)

SBIR Investment: \$870K

Project Revenue: \$587K

Combustion Research and Flow Technology (CRAFT Tech)

6210 Kellers Church Road

Pipersville, PA 18947

(215) 766-1520

www.craft-tech.com

ajs@craft-tech.com

sinha@craft-tech.com

Neeraj Sinha

Srinivasan Arunajatesan



## Advanced Solid State High Repetition Rate Modulator



Upgraded AN/SPG-60 Radar Transmitter

### APPLICATIONS

- AN/SPG-60 Radar upgrade (Mk 86 FCS)
- AN/SPS-49 Radar Transmitter
- Multi-Target Instrumentation Radar (MIR) upgrade
- COBRA JUDY X-Band Radar upgrade
- AN/SPQ-9A Radar upgrade
- Air traffic control radar
- Haystack Ultra-Wideband Satellite Imaging Radar (HUSIR)
- Semiconductor and metal surface treatment processes using ion implantation
- Medical accelerators for cancer therapy
- Pulsed electric field processing of juices and liquid foods
- High power X-ray systems for baggage/container inspection
- High energy physics research (particle accelerators, fusion research, etc.)

### ABOUT THE COMPANY

Diversified Technologies, Inc. was founded in 1987 by graduates of the Massachusetts Institute of Technology. DTI designs, manufactures, and markets the patented PowerMod™ line of high-power, solid-state, modulators and control systems. The company's core expertise is in the application of solid-state devices for high power, high voltage opening and closing switches. PowerMod™ links these devices in series and parallel, ensuring that the load is shared equally and no single device experiences harmful or destructive voltages. PowerMod™ was selected twice by R&D Magazine as one of the 100 most significant products of the year.

### ABOUT THE TECHNOLOGY

Diversified Technologies (DTI) adapted its patented high-power, solid-state, modulators and control systems to develop the Navy's AN-SPG/60 fire control radar upgrade kit. The kit modernizes the radar's transmitter section by replacing older vacuum tube devices with high voltage switching modules, gate drives, and interface electronics. The kits are currently installed and operating in the US Navy fleet with a similar program for the AN/SPQ-9A radar soon entering production.

### MILITARY & COMMERCIAL SIGNIFICANCE

DTI's solid-state radar transmitter technology significantly increases reliability of critical weapon guidance/fire control systems. The mean time between failures of the AN/SPG-60 radar transmitter is predicted to significantly increase from 300 hours to 50,000 hours, reducing both repair costs and maintenance manpower. The system is easier to fix, replacement parts are less expensive, and electronic components are 40 - 90% more efficient. As a result of these improvements, operating cost for the upgraded transmitter is expected to drop by over 90%. Additionally, the upgraded transmitter can return to operational status in microseconds after a klystron arc, allowing the system to remain operational during target tracking periods. Transmitter testing and operation are now safer with the low-voltage control circuit that isolates operators from high-voltage components.

The AN/SPG-60 radar system developed as a result of this SBIR effort has enabled an entire class of radar upgrades, allowing the US Navy fleet and other services to extend the operational life of critical radar systems. The success of the program has directly led to initiation of upgrade programs for other critical weapon systems, such as the AN/SPQ-9A radar. The underlying technology has facilitated a new category of solid state pulse power systems for semiconductor fabrication, food processing, and medical systems.

**Diversified Technologies, Inc.**  
35 Wiggins Avenue  
Bedford, MA 01730  
(781) 275-9444  
www.divtecs.com  
kempkes@divtecs.com  
Michael Kempkes

**Topic Number: N98-003 (ONR)**  
**SBIR Investment: \$556K**  
**Project Revenue: \$10.6M**

# Remote Fiber Optic Sensors for Gaseous and Liquid Environments Based on Surface Enhanced Raman Spectroscopy

## ABOUT THE TECHNOLOGY

Raman spectroscopy provides a unique fingerprint of the vibrational modes of a substance, and is similar to infrared spectroscopy in this regard. However, unlike infrared, Raman employs visible or near-infrared laser light to address the sample that is efficiently transmitted over conventional silica optical fibers. Cables up to 200 meters long have been employed with limited signal loss. This capability is a result of a compact sampling probe with microoptical components, developed and patented by EIC Laboratories. The RamanProbe™ probehead eliminates Raman scattering originating from the silica fiber optics and completely filters the laser wavelength prior to detection. A further feature of this probe is that it focuses the laser light several millimeters past the probe tip. This allows high quality Raman spectra to be obtained through the walls of transparent and translucent containers with little interference from the container materials themselves (e.g. glass, polyethylene, brown glass, etc.).

## MILITARY & COMMERCIAL SIGNIFICANCE

The highly compact and versatile field portable RamanProbe™ instruments are used by DoD for a variety of chemical identification and analysis tasks. Using EIC's RamanProbe™ and Raman spectroscopy together permits the collection of a wide range of high quality Raman spectra samples. Tethering the sampling head to a flexible fiber optical cable facilitates the capturing of spectra located in difficult areas.



RamanProbes

## APPLICATIONS

- Identification of unknown and hazardous chemicals in sealed bottles
- On-site identification of chemical agents and toxic industrial chemicals in various sample formats, including spills in water and on equipment surfaces
- Real time monitoring of chemical reactions using industrial immersion probes
- Quality control measurements in chemical and pharmaceutical manufacturing facilities
- In situ detection and identification of corrosion within pipes and heat exchangers
- Using special Surface Enhanced Raman techniques, detection and identification of highly dilute chemicals in air and water

## ABOUT THE COMPANY

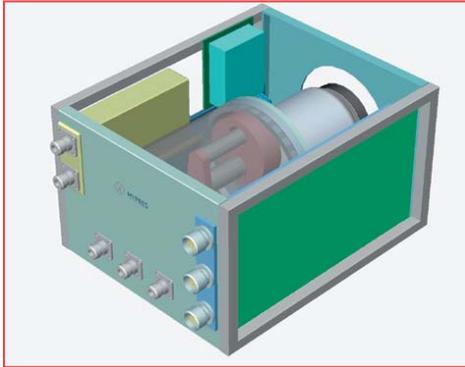
In 1998, EIC Laboratories, Inc. spun off InPhotonics, Inc. to manufacture the RamanProbe™ along with high performance, portable Raman instrumentation. The new company is successful and self-sustaining from product sales. The original RamanProbe™ design has formed the basis of a complete product line to address many different market sectors: research, general analytical, real-time reaction monitoring, environmental/forensic, and on-line process monitoring. Over 400 probes have been delivered since initial development. Paired with InPhotonics' portable Raman spectrometer, the RamanProbe™ is a versatile sampling tool ideal for Homeland Defense applications.

**Topic Number: N87-263 (ONR)**

**SBIR Investment: \$550K**

**Project Revenue: \$1.64M**

**EIC Laboratories, Inc**  
**111 Downey Street**  
**Norwood, MA 02062-2612**  
**(781) 769-9450**  
**www.eiclabs.com**  
**drauh@eiclabs.com**  
**R. David Rauh**



All Digital Receiver (ADR)

## All Digital Receiver

### ABOUT THE TECHNOLOGY

HYPRES has produced the world's first All Digital Receiver (ADR) based on Superconducting MicroElectronics (SME). ADR is designed to demonstrate the ability to directly digitize and process multiple Joint Tactical Radio System (JTRS) waveforms simultaneously from a single wideband digital sample, at an extremely high speed (40 GHz). HYPRES calls this process "Digital RF" as it combines for the first time, analog-to-digital and digital signal processing on the same device, running at the same 40 GHz clock speed. SME technology exceeds the processing capabilities of the best semiconductor analog-to-digital technology and greatly improves the performance of the JTRS and other military communication systems. The research was accomplished in collaboration with the State University of New York at Stony Brook, and other leading universities.

### MILITARY & COMMERCIAL SIGNIFICANCE

ADR provides critically needed transformational communications capabilities to Naval warfighters. HYPRES will use the ADR prototype to develop, in conjunction with the Army, Navy, and other DoD agencies, an All Digital Transceiver (ADT) product line for DoD JTRS and SATCOM. The ADT product, which has commercial wireless communication applications, combines reception and transmission in a compact, rugged form factor. The ADT dramatically improves transmission and reception performance. Its simplistic and efficient improvements substantially reduces cost, size, weight, and power consumption of JTRS and other systems. In addition to communications, applications in Signals Intelligence and Electronic Warfare are being pursued with various DoD agencies. HYPRES SME technology uniquely supports the high-speed wideband RF processing needs of emerging new DoD communications capabilities such as the Wideband Networking Waveform that is a critical innovation of the JTRS program.

### APPLICATIONS

- Army JTRS Cluster 1 Airborne and ground radio systems
- Air Force-Navy JTRS Airborne, Maritime & Fixed Station
- DoD SATCOM systems; Defense Communications Army Transmission System (DCATS)
- Commercial wireless base station infrastructure

### ABOUT THE COMPANY

HYPRES, Inc. is engaged in the development and commercialization of Superconducting MicroElectronics (SME) technology. Superconducting integrated circuits (ICs) represent a significant advance over existing semi-conductor technologies. HYPRES has established world-leadership in superconducting technology and is the premier commercial supplier of primary voltage standard systems used in metrology laboratories worldwide.

HYPRES, Inc. was founded in 1983 and has since been active in advanced R&D programs while developing the second generation integrated circuits (IC) technology for superconductive electronics. This technology includes a reliable all-refractory niobium IC process that resolves the materials-related issues that limited success in the IBM Josephson computer program. In addition, a new logic family takes full advantage of the intrinsic properties of superconductors and enables gate speeds approaching 1,000 GHz.

Topic Number: N00-T001 (ONR)

STTR Investment: \$850K

Project Revenue: \$3.1M

HYPRES, Inc.  
175 Clearbrook Road  
Elmsford, NY 10523-1109  
(914) 592-1190  
www.hypres.com  
rehitt@hypres.com  
Richard Hitt

# Broadband Signature Information Identification and Extraction

## ABOUT THE TECHNOLOGY

Broadband feature extractors (BFE) were developed to assess the practicality of using high-order spectral analysis as discriminating signature components. An algorithm was developed to measure the non-Gaussian characteristics of a broadband signature. These properties discriminate man-made noise from natural sounds. A contact follower was devised to “scissor,” beam formed data and produce a continuous signature of each contact as it moves in azimuth relative to the sonar array. The broadband feature extractors operate directly on the signature of each contact and develop a continuous history of the features of each contact. The extractor recognizes the characteristics of the contact and by comparing the signal with the history base presents information to the sonar technician.

## MILITARY & COMMERCIAL SIGNIFICANCE

BFE offers superior performance for detecting and classifying undersea contacts over previous detection methods. BFE aids the operator in the assessment of the tactical situation by presenting likely threat information about the targeted contact. Innovative Technology Associates (ITA) uses color contact broadband encoding information to make operator classification simpler, which improves performance. This improved performance of detections has resulted in a system that is capable of better recognition of contacts that pose a threat to the Navy and offers high discrimination of non-threat contacts.



Sonar Technician

## APPLICATIONS

- SQQ-89A(V)15 Torpedo Recognition and Alerting Functional Segment (TRAFS)
- X-rays, magnetic resonance images (MRIs), and astronomy

## ABOUT THE COMPANY

Innovative Technology Associates was a supplier of specialized software, complex processing algorithms, and advanced systems in support of defense applications. ITA processes allow rapid insertion of commercial off-the-shelf technologies, which has become a hallmark of ITA. The company has been purchased by General Dynamics.

**Topic Number: N97-160 (SPAWAR)**

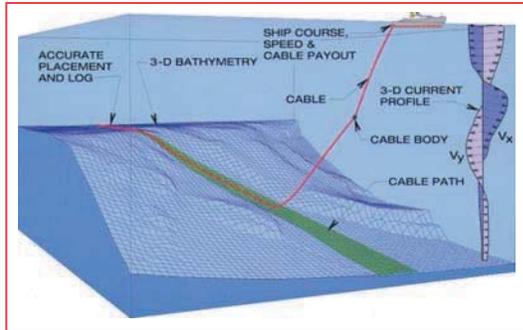
**SBIR Investment: \$850K**

**Project Revenue: \$1.23M**

**Innovative Technology Associates**  
**12450 Fair Lakes Circle, Suite 500**  
**Fairfax, VA 22033**  
**(703) 263-2800**  
**www.gd-ais.com**  
**wmahood@dsrnet.com**  
**William Mahood**



## Near Real Time Installation of Cables and Sensor Arrays Deployed from a Towed Body



Final testing of Makailay

### APPLICATIONS

- The military version of this technology is being used on ASW training ranges and in SPAWAR's Advanced Deployable System (ADS) program.
- Makai developed two commercial products based on this technology: MakaiPlan Pro and MakaiLay. They are being used by several telecommunication companies in the planning and real-time control installation of submarine cables from surface vessels. There are also some commercial geo-technical surveying applications.
- Makai received a \$100K award from the National Defense Center of Excellence for its innovative research in ocean science related to this project.

### ABOUT THE COMPANY

Makai Ocean Engineering, Inc. was established in 1973 as a diversified ocean engineering and naval architecture company providing service in Hawaii and the Pacific. Today, Makai provides ocean engineering services worldwide and is a major supplier of submarine cable installation and planning software.

### ABOUT THE TECHNOLOGY

The ability to simulate, monitor, and control complex at-sea cable and array installations from a towed body has been a costly problem for the Navy and commercial ventures. The technology to solve this problem has been developed by Makai through its element location prediction (ELP) model. The ELP computes the position of the submarine relative to a very lightweight array deployed from an underwater towed body. Through numerical and computational evaluations of input data from deployed instrumentation, the ELP enables the cables to be laid accurately and straight, using relatively low-skilled personnel.

### MILITARY & COMMERCIAL SIGNIFICANCE

The Navy's computer model was slow, complicated to use, and costly. Makai has developed a more rigorous program that is 150 times faster than current Navy software, more accurate, provides useful solutions, is easy to use, and has the ability to operate on a standard PC. The ELP model has immediate access to deployed array and has improved array element placement accuracy. Makai provides SPAWAR and the Navy with the only model that achieves all of the desired technical requirements.

Makai Ocean Engineering, Inc.  
PO Box 1206  
Kailua, HI 96734  
(808) 259-8871  
www.makai.com  
jose.andres@makai.com  
Jose Andres

Topic Number: N99-171 (SPAWAR)  
SBIR Investment: \$901K  
Project Revenue: \$6.74M

# Low Cost Broadband Mk 54 Torpedo Arrays

## ABOUT THE TECHNOLOGY

Naval operations in littoral waters can be much more challenging than those taking place in deeper waters. In shallow water, reverberation and noise from obstacles and nearby commercial shipping limits the ability of existing sonar to warn surface ships of sub-surface threats, such as mines and enemy submarines, and reduces the clear targeting of threats by the ship's torpedo defenses. However, broadening the sonar bandwidth by using broadband transducers and arrays increases the sonar's search ability. In order to upgrade weapon performance in the difficult littoral environment, Materials Systems Inc. (MSI) is developing, based on its advanced piezocomposite transducer technology, a broad bandwidth sonar array for the Mk 54 Lightweight Torpedo.

## MILITARY & COMMERCIAL SIGNIFICANCE

The Mk 54 Lightweight Torpedo is the primary defense for Navy surface ships and airborne anti-submarine warfare platforms against enemy submarines. The upgraded Mk 54 sonar homing array is expected to substantially improve the ability of the Mk 54 Lightweight Torpedo to find its target in shallow waters. In addition, MSI's piezocomposite sonar array manufacturing technology should reduce the cost of the Mk 54 array by about 50% over the existing system. MSI is also developing broadband sonar arrays for a variety of other Navy and commercial undersea systems and is expanding its current markets in piezocomposite undersea survey sonar array products to include transmit arrays.



Mk 54 Lightweight Torpedo in Action

## APPLICATIONS

- Mk 48 ADCAP heavyweight torpedo arrays
- In-stride mine avoidance sonar
- Mine detection and classification sonar
- WSQ-11 torpedo defense sonar and AUV sonar
- Industrial ultrasound uses
- Commercial sonar uses

## ABOUT THE COMPANY

Founded in 1991 and headquartered in Littleton, Massachusetts, Materials Systems Inc. develops and manufactures advanced materials and custom components for defense and commercial systems customers. MSI products range from acoustic transducers for underwater sonar and industrial ultrasound to large sapphire windows for transparent armor and infrared surveillance. MSI's pioneering development of low cost injection molding for manufacturing piezocomposite opened the way for application of this powerful acoustic transducer material in sonar and ultrasound. During the past 12 years, MSI has become the recognized leader in providing high performance piezocomposite transducers to the US Navy, and for a variety of other applications beneficial to the defense and commercial industries.

**Topic Number: N02-066 (ONR)**

**SBIR Investment: \$370K**

**Project Revenue: \$8.6M**

**Materials Systems Inc.**

**543 Great Road**

**Littleton, MA 01460**

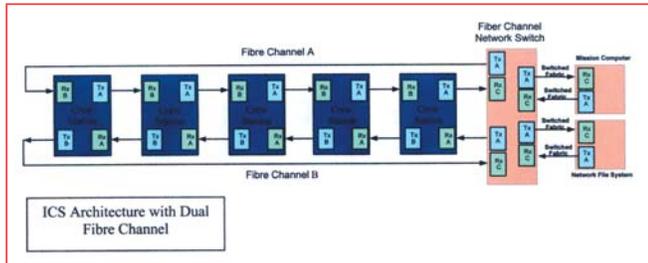
**(978) 486-0404**

**www.matsysinc.com**

**ideas@matsysinc.com**

**Les Bowen**

# Development of the Advanced Intercommunications Systems (AICS)



ICS Architecture with Dual Fibre Channel

## APPLICATIONS

- Multi-place aircraft: E-2C Inter-Communications System

## ABOUT THE COMPANY

For more than 40 years, Mathtech, Inc. has combined analytical thinking with leading-edge technology to help clients solve complex problems. The company equips government, business and legal clients with quantifiable answers that keep them out in front of changing times and challenges. Recently, Mathtech was awarded a \$16.8 M contract from Northrop Grumman to supply the ICS for the Advanced Hawkeye aircraft. The award is the single largest contract that Mathtech has received in its forty year history and affords the company the ability to develop new product lines and expand services.

## ABOUT THE TECHNOLOGY

The Advanced Intercommunications Systems (AICS) is a digital intercommunications system (ICS) designed for airborne use in multi-place aircraft. The AICS was developed by Mathtech, Inc. for a retrofit to the Navy E-2C Hawkeye aircraft. It has an embedded PC-based system that runs real-time voice over a dual Fibre Channel. Mathtech's technology offers a distributed digital approach. The AICS has one Weapons Replaceable Assembly (WRA), a Crew Station, and no other active circuitry. The Crew Station WRA incorporates the interface with all audio sources for each crew member. Mathtech's Crew Station is a lighter, smaller, and less expensive version of the CrewComm unit that is packaged without communications interface circuitry. The AICS can be mixed with the CrewComm in any installation.

## MILITARY & COMMERCIAL SIGNIFICANCE

Mathtech's AICS is less expensive than similar ICSs. The system is suitable for military and government use on any multi-place aircraft. The AICS offers its users a customizable front panel and an open architecture for the data bus. The design avoids the drawbacks of a central hub WRA, such as single point of failure, added weight, and increased system cost. It distributes the radio and other audio inputs such as warning tones over all Crew Station WRAs. The small, lightweight system was designed for performance, versatility, manufacturability, and supportability. The AICS provides real distributed processing capabilities. Unlike other ICSs, AICS does not depend on any central communications processing hub. Each "intelligent" AICS WRA has its own processor. Each Crew Station can interface with up to three analog audio sources, digitizing each and placing the audio on the Fibre Channel that is accessible to all crew positions. This facilitates each Crew Station access to all 15 analog audio sources.

## Aircraft Wireless Intercommunications Systems (AWICS)

### ABOUT THE TECHNOLOGY

Multispectral Solutions, Inc. (MSSI) has developed an Ultra Wideband (UWB) technology that employs ultra short radio frequency (RF) bursts. The technology solved a major challenge for RF communications - the interference caused by the reflection of RF energy known as "multipath". A particularly severe condition of multipath occurs inside the metal shell of aircraft and helicopters, an environment where the bounce and reflection of RF signals inhibit the ability to establish reliable wireless communication. By employing its UWB technology, MSSI successfully created a wireless intercommunications system that addresses the crucial RF wireless communication problem of multipath interference.

### MILITARY & COMMERCIAL SIGNIFICANCE

The excellent performance of the UWB wireless intercom system while operating in severe multipath environments has been clearly demonstrated in numerous field tests onboard a variety of Navy/Marine Corps helicopters and fixed wing platforms. The system allows crews to untether from aircraft ICS long cords, improving mobility, flight safety and emergency egress. Further, replacing the communication cord with the a covert UWB RF link dramatically improves operational effectiveness without exposing the crew to electronic warfare threats. UWB technology can also provides industry and consumers with an interference-free method of communicating higher-quality audio for business, home, and office.



Aircraft Wireless Intercommunications Systems (AWICS)



Integrated ICS Control Box with AWICS

### APPLICATIONS

- Aircraft Communication Systems for CH-53D/E, MH-53E, CH-46E, and C-2A aircraft
- Ships/boats communications
- Ground Vehicles Communication Systems (Tanks, HUMMMVs, fire operations, ambulances)
- Ground Control Stations
- Portable radios
- Home/office intercom
- High fidelity infant / baby monitor
- Professional level audio systems

### ABOUT THE COMPANY

Multispectral Solutions, Inc. is recognized worldwide as the industry leader in Ultra Wideband (UWB), an emerging wireless technology for communications, precision localization and radar applications. Founding Multispectral Solutions, Inc. in 1988, President and CEO Dr. Robert J. Fontana (Ph.D. Stanford), has lead MSSI for the last 16 years, developing a strong reputation for quality and innovation. Clientele includes a wide variety of Government agencies, military organizations and commercial corporations.

Topic Number: N99-055 (NAVAIR)

SBIR Investment: \$1.1M

Project Revenue: \$25M

Multispectral Solutions, Inc. (MSSI)  
20300 Century Blvd., Suite 250  
Germantown, MD 20874-1749  
(301) 528-1745  
[www.multispectral.com](http://www.multispectral.com)  
[rmulloy@multispectral.com](mailto:rmulloy@multispectral.com)  
Robert Mulloy



Advanced real-time hardware, tested and verified, for defense manufacturing

## Metal Plate Forming

### ABOUT THE TECHNOLOGY

The current method of producing three dimensional shapes for Navy ship hulls and other structures consists of manual thermal forming by skilled labor that uses oxy-acetylene torches and water hoses. The process is very costly, labor intensive, inaccurate, and slow. Native American Technologies Company (N.A. Tech) has developed the Light Induced Thermal Shape Forming (LITS-Form) process to address this problem. The LITS-Form process uses advanced high-energy heat sources, automated manipulators to position the heat at precise locations, intelligent controls, and computerized off-line planning. The process is cost effective, uses minimal labor, produces highly accurate parts, and is up to 100 times faster than manual plate forming.

### MILITARY & COMMERCIAL SIGNIFICANCE

Ship hull plate shaping is critical in NAVSEA's DD21 program. Manual forming, roll forming, and break press forming is very slow and tedious work. A typical Navy destroyer requires many thousands of man hours and up to 18 months or more to produce just the 3-D ship hull plate shapes. Jigs and templates are produced from CAD lofts, then using oxy-acetylene torches and water hoses a 1" thick steel plate is coaxed into shape.

The LITS-Form process uses automated and robotic forming to reduce cost, improve speed, enhance accuracy, and enable better plate shape consistency and quality. The LITS-Form process forms the three-dimensional plate shapes of a destroyer in about 1-2 months, thus reducing the production process by ninety percent and labor cost by at least fifty percent. Since the LITS-Form process is completely automated, adding the plasma cutting option to the system eliminates two other inefficiencies: manual pre-cutting of the parts before forming and final manual trim cutting of components after forming. N.A. Tech's LITS-Form process and automated cutting option improves the speed and accuracy of ship hull plate shaping, and reduces cost for a host of other military and commercial endeavors.

### APPLICATIONS

- ONR DD21: ship hull production
- Jet engine repair
- Armor and artillery systems, remote minefield neutralization
- Spacecraft performance, component production
- Rapid prototyping for crash and safety testing
- Storage and safety of spent fuel and transportation containers

### ABOUT THE COMPANY

Native American Technologies Company provides advanced software and engineering solutions for welding and manufacturing processes via its standard software and hardware products. About fifty percent of sales are in the welding industry, with products for process modeling, optimization, process monitoring, process control, and quality control. N. A. Tech offers products and services for CAD-based robot operations and programming, metal forming, metal alloy design, and general materials and metallurgical consulting. The company's client list includes Ford Motor, General Motors, Caterpillar, Daimler-Chrysler, Johnson Controls, Tower Automotive, Boeing, Lockheed-Martin, Trico Products, Delphi, and Hydro Automotive.

Native American Technologies Company  
P.O. Box 39  
Golden, CO 80402  
(303) 279-7942  
www.natech-inc.com  
jejones@natech-inc.com  
Dr. Jerry Jones

Topic Number: N98-001 (ONR)  
SBIR Investment: \$595K  
Project Revenue: \$14.7M

# Air-Deployable Expendable Multi-Parameter Environmental Probe (AEMEP)

## ABOUT THE TECHNOLOGY

Navmar Applied Sciences Corporation (Navmar) has developed critical environmental sensor technology that can be adapted into the design of an air-deployable, expendable, multi-parameter environmental probe (AEMEP). Specifically, Navmar has produced several innovative sensor technologies useful in an air deployable, expendable sensor buoy released to monitor the dynamic open ocean and littoral environments. The AEMEP has the ability to collect, process, and remotely transmit via Iridium SATCOM environmental acoustic data required by the US Navy to enhance anti-submarine warfare operations.

## MILITARY & COMMERCIAL SIGNIFICANCE

NAVMAR has successfully adapted the AEMEP concept to meet the Navy's requirements for the Tactical Acoustic Measurement Decision Aid program, whose goal is to create a next-generation "environmental store" of oceanographic acoustic data. Navmar's AEMEP unit has become the basic building block system for the development of the sonobuoy sensor probe, with recent tests demonstrating the ability to collect oceanographic data over long periods of time. Since the sensor probe is airborne deployable, it allows for a rapid response to worldwide threats. The AEMEP is efficient and cost effective, while traditionally ocean survey efforts have been expensive and time consuming. The AEMEP's multiple parameter measurement and reporting capability eliminates the need for multiple sensor probes and so saves money. By employing this inexpensive, expendable, autonomous buoy system, the oceanographic community greatly reduces the cost and duration of surveying and exploration.



The AEMEP collects, processes, and transmits oceanographic and environmental acoustic data

## APPLICATIONS

- Sea bed classification technology for long term, littoral bottom sediment surveys
- Moored buoy applications for oceanography, environmental and weather research
- Ocean optical properties sensors for fishing industry
- Commercial oil industry site survey and exploration

## ABOUT THE COMPANY

Navmar Applied Sciences Corporation, a professional engineering services firm, has assisted clients over the past 20 years in meeting the challenges of an ever-changing national and international environment. The engineering disciplines encompass systems engineering, system design, systems integration, life cycle management, operations research/cost analysis, software development, test/evaluation, and training system development. Its subject matter expertise includes: air vehicle, material sciences, avionics, air crew, electro-optics, acoustic sensor, radar, communication and navigation.

**Topic Number: N94-178 (NAVAIR)**

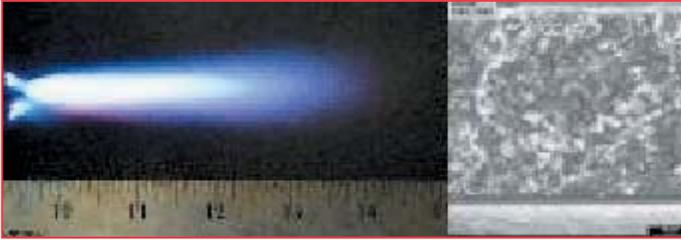
**SBIR Investment: \$1.2M**

**Project Revenue: \$572K**

**Navmar Applied Sciences Corporation**  
65 West Street Road, Suite B-104  
Warminster, PA 18974  
(610) 619 - 7449  
[www.navmar.com](http://www.navmar.com)  
[noonan@navmar.com](mailto:noonan@navmar.com)  
Tom Noonan



# Embedded Capacitors for Multichip Modules and Printed Circuit Boards



CCVD flame is used to create embedded capacitors

## APPLICATIONS

- High-density microelectronic packaging and power electronics
- Solar cells
- Broadband, electronics
- Superconductors, barrier coating

## ABOUT THE COMPANY

Since 1994, nGimat has demonstrated the ability to establish successful customer relationships and effectively use SBIR funding. Based on technical success from funding by the Navy, nGimat negotiated a multi-million dollar long-term development and license agreement in partnership with Rohm & Haas to develop advanced materials for electronic applications. In addition, nGimat recently entered into a licensing agreement with M&G Corp. of Italy, the world's second largest producer of polyethylene terephthalate ("PET") flat films, to apply the CCVD process to O<sub>2</sub> barrier coatings on PET. nGimat now has three licensees for its CCVD and NanoSpray(SM) technologies.

Through development efforts such as those funded by the Navy, nGimat has built an intellectual property portfolio of 30 issued U.S. patents and multiple patent applications pending, which covers its raw materials, processes, equipment, composition of matter, intermediate products and final products.

## ABOUT THE TECHNOLOGY

There is a strong desire among consumers for smaller, lighter, and less expensive electronics that are reliable and performs well. Generally, electronics are manufactured using discrete "surface mount" resistors and capacitors, which pose a major barrier to miniaturization. The repetitive "pick-and-place" surface mount manufacturing procedure is time consuming and susceptible to placement errors. nGimat Co. has addressed this problem by producing innovative thin film materials and passive devices that can be embedded within the circuit board, thereby freeing up valuable space to allow miniaturization. Embedded passives are produced through the use of nGimat's Combustion Chemical Vapor Deposition (CCVD) and NanoSpray(SM) technologies.

## MILITARY & COMMERCIAL SIGNIFICANCE

Embedded capacitors improve electrical performance and reliability while reducing manufacturing cost and production time. The capacitor, using the CCVD process, offer the potential for capacitance densities greater than 200nF/cm<sup>2</sup>, leakage current densities below 100nA/cm<sup>2</sup>, and breakdown fields in excess of 5MV/cm. The use of embedded passives also reduces the amount of toxic lead solder used in manufacturing.

**nGimat Company**  
5315 Peachtree Industrial Blvd.  
Atlanta, GA 30341  
(678) 287-3913  
www.ngimat.com  
tpolley@ngimat.com  
Todd Polley, Ph.D.

**Topic Number: D97-T003 (ONR)**  
**STTR Investment: \$700K**  
**Project Revenue: \$7M**

# Materials Research In Sliding Electric Contacts

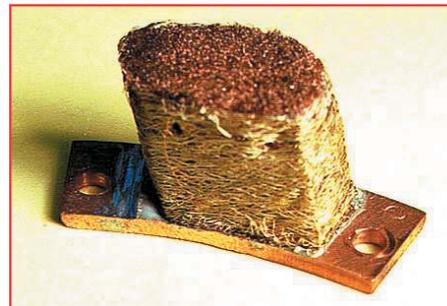


## ABOUT THE TECHNOLOGY

As a result of using monolithic carbon brushes on 500 kW motor generators found onboard submarines the Navy has experienced high maintenance cost, frequent equipment repair and replacement, and lack of favorable working conditions for sailors. Utilizing carbon brushes on submarine motors and generators also damages rotors and decreases the longevity of the equipment. The brushes' electrical conductivity produces shorts, grounds and equipment fires. Further, when carbon dust from the brushes mixes with oil vapors, electrical insulation is softened, resulting in the need to remove, re-insulate, re-install and re-test the units, at great time and expense to the Navy. Sailors who clean the abrasive carbon dust that builds up from the use of the brushes find the work unpleasant, dirty, and repetitive. To address the effects of using carbon brushes Noesis, Inc. teamed with the University of Virginia (UVA) to develop the advanced metal fiber brush (AMFB).

## MILITARY & COMMERCIAL SIGNIFICANCE

The AMFB offers significant improvements over carbon brushes. During at-sea tests aboard the USS Dolphin (AGSS 555) and in land based qualification tests the AMFB exceeded all naval technical requirements. The brushes' electrical performance is markedly superior - and the debris that is produced during use is non-conductive. The AMFB achieves greater operational availability of critical electrical machines, reduces maintenance cost, and improves environmental living and working conditions for sailors. The AMFB is applicable for all military motor systems that currently employ carbon brushes as well as commercial products that are similarly hampered by the effects of carbon dust build-up. AMFB technology has shown promise as an enabling technology for advanced electric ship drives, and it presents an exciting opportunity for manufacturers, of electrical motors, that are in need of advanced, low-electrical-loss, high current-carrying brushes.



Metal Fiber Brushes

## APPLICATIONS

- Naval submarine 500kW motor generator
- Hand-held electric tools
- Automotive components
- Motorized wheelchairs
- Electric ship drives
- Electric motors

## ABOUT THE COMPANY

Noesis, Inc. provides program acquisition support and technical expertise to federal science and technology organizations. It facilitates the flow of knowledge and information to enhance the quality of technology products delivered to end users. Noesis assists government customers in determining effective ways to transition systems and technologies into acquisition from government laboratories to industry. Noesis, Inc. and the University of Virginia Patent Foundation formed HiPerCon, LLC, so as to tap into the large market potential and wide spectrum of commercial applications for metal fiber brushes.

Topic Number: N96-103 (NAVSEA)

SBIR Investment: \$840K

Project Revenue: \$13.6M

Noesis, Inc.  
 10440 Balls Ford Road, Suite 250  
 Manassas, VA 20109-2602  
 (703) 741-0300  
[www.noesis-inc.com](http://www.noesis-inc.com)  
[asullivan@noesis-inc.com](mailto:asullivan@noesis-inc.com)  
 Art Sullivan



## Wideband Intra-Battle Group Communications (WIC)



WIC adds up to 4.608 mbps of adaptive multi-user wireless network capacity

### APPLICATIONS

- SCA compatibility
- Multi-user wireless network
- HDR LOS communications
- Digital modular radio

### ABOUT THE COMPANY

Nova Engineering, Inc. is an innovative wireless data communication product company. It is an industry leader in area mobile ad-hoc wireless networks, unattended ground sensors, exotic modem and waveform development, advanced telemetry, and communication development tools. Nova has recently formed a separate division, Nova Systems Solutions, to focus on software defined radios. The division is active in the JTRS program and is currently subcontracting with Boeing on the JTRS Cluster 1 Wideband Networking Waveform. Nova has funded \$82K for an internal research and development project to develop a "SCA Lite" core framework for commercial application of WIC.

### ABOUT THE TECHNOLOGY

Nova has developed a spectrally efficient, wideband, nonproprietary, open source example waveform that is compliant with software communication architecture (SCA). Wideband Intra-Battle Group Communications (WIC) is designed to be resistant to channel impairments, commonly encountered in the Navy's signaling environment. The work realizes ubiquitous connectivity through integration of the high data rate (HDR) line-of-sight (LOS) waveform into digital modular radio or similar software defined radios. The HDR LOS waveform concentrates users into terrestrial burst rates to 1.536 Mbps operating on 600 KHz of bandwidth.

### MILITARY & COMMERCIAL SIGNIFICANCE

The US Navy desired a means for HDR LOS communications among ships, submarines, and shore sites. Before WIC, the total point-to-point intra-battle group terrestrial data capacity was less than a few hundred kbps per ship. The capacity was just marginally adequate several years ago. Now, the increase in traffic load has resulted in requirements far exceeding current capacity. Nova Engineering's wireless waveform fulfills the need for increased data capacity. The waveform adds up to 4.608 mbps of reliable, adaptive multi-user wireless network capability to each ship within a battle group. It enables fixes to software bugs in the field by incorporating self-enabling error capability. The waveform has the added benefit of simplified user access and substantially enhanced timeliness/diversity of applications executed on the ship. WIC's reference implementation significantly reduces development costs due to new communication waveforms and services that can be added without changing the hardware.

Nova Engineering, Inc.  
5 Circle Freeway Drive  
Cincinnati, OH 45246-1201  
(513)478-7845  
www.nova-eng.com  
steveo@nova-eng.com  
Steve Olenick

Topic Number: N00-030 (SPAWAR)  
SBIR Investment: \$849K  
Project Revenue: \$2.68M



## Underwater Autonomous Power Generation

### ABOUT THE TECHNOLOGY

Ocean Power Technologies, Inc. (OPT) has developed a revolutionary renewable energy technology for converting large amounts of reliable and predictable energy in ocean waves into low cost, non-polluting electricity. OPT's proprietary PowerBuoy™ wave generation systems are modular in character with each PowerBuoy™ wave generation system using a “smart”, ocean-going buoy to capture and convert wave energy into a controlled mechanical force that drives an electric generator. The rising and falling of the waves offshore causes the buoy to move freely up and down, and the resultant mechanical stroking drives the electrical generator. Generally, the generated AC power is converted into high voltage DC and is transmitted ashore via an underwater power cable. Large power stations can be economically built by assembling arrays of PowerBuoy™. The technical feasibility, the simplicity of deployment, and the survivability in storms of the OPT system has been demonstrated in several ONR SBIR ocean trials.

### MILITARY & COMMERCIAL SIGNIFICANCE

The economic and environmental cost of providing power to DoD coastal facilities around the world is high. In many cases these facilities are totally dependent upon fossil fuel to generate power. PowerBuoy™ requires no fuel, thereby greatly reducing the cost of electricity. With the OPT systems there are no pollutants, no radioactivity, or other environmental problems. The systems can be used for commercial applications to (a) produce low cost electricity for disassociation of sea water into hydrogen and oxygen – the hydrogen can subsequently be used as a fuel or in a fuel cell to produce electricity, (b) desalinate sea water, and (c) natural resource processing/refinement plants.



PowerBuoy™

### APPLICATIONS

- Power generation infrastructure
- Standby and operational power for systems left on the ocean floor
- Power generation for the Advanced Deployable System
- Battery recharge at or below the surface of the ocean for Autonomous Underwater Vehicles
- Array of the Autonomous Oceanographic Sampling Networks

### ABOUT THE COMPANY

Ocean Power Technologies, Inc. is the leader in cost-effective, advanced, and environmentally sound offshore wave power technology. Navy SBIR funding for testing and development of PowerBuoy™ wave power generator system has directly resulted in increased revenue for the company and potential sales from large commercial power generating systems. The success of OPT's system is expected to result in the core “building block” for future OPT commercial applications enabling OPT to sell products to a broad base of commercial applications.

**Topic Number: N95-074 (ONR)**

**SBIR Investment: \$1.02M**

**Project Revenue: \$10.7M**

**Ocean Power Technologies, Inc.**

**1590 Reed Road**

**Pennington, NJ 08534**

**(609) 730-0400**

**[www.oceanpowertech.com](http://www.oceanpowertech.com)**

**[cdunleavy@oceanpowertech.com](mailto:cdunleavy@oceanpowertech.com)**

**Charles Dunleavy**



# Fiber Optic Computer Systems and Sensor Technology for Affordability known as Smart Skin Array Technology (SSAT)



Flexible 12 Channel Cable

## APPLICATIONS

- Data link & controls
- Military uniforms for detection of position and communication
- Fly-by-light
- Optical Backplane Interconnect Systems
- Autonomous Space Vehicles
- Data interconnect; sensing; computer controls
- Airframe inclusion

## ABOUT THE COMPANY

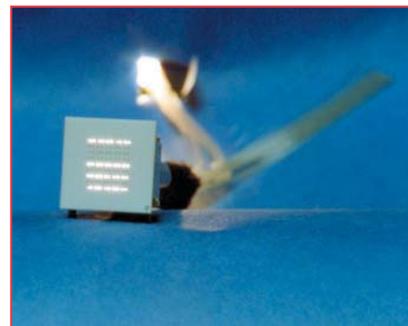
Page Automated Telecommunications Systems, Inc. (PATSI) is a leading developer and manufacturer of high performance fiberoptic interconnect systems. PATSI has a successful history in SBIR commercial and military based projects. PATSI has skillfully blended innovation and pragmatism in the design and manufacture of its systems. Patented Flexible Fiberoptic Technology delivers high performance, robust, scalable products, and the most flexible cable assemblies in the industry. PATSI has received nine worldwide patents for the SSAT technology.

## ABOUT THE TECHNOLOGY

Page Automated Telecommunications Systems, Inc. (PATSI) developed Smart Skin Array Technology (SSAT) as a new and advantageous way of packaging fiber optic systems. It is based on an innovative optical fiber weaving technology, which allows highly dense fiber optic parallel pathways up to 100 channels per inch to be manufactured in a repeatable manner. PATSI developed SSAT to provide a single scalable technology for which the manufacturing process is transparent to the customization of fiber optics type and number, composite materials, and allows customers diversity in application and procedure.

## MILITARY & COMMERCIAL SIGNIFICANCE

SSAT technology is electromechanical interference resistant, flexible, compact, and high-low temperature resistant. The technology provides robust structure sensing devices and photonic data links for military aircraft and space application. Its low weight coating material decreases carry load, thus increases aircraft performance and fuel efficiency. SSAT is an enabling technology that is simple in design, reduces the number of optical and non-optical steps required in a processing system, decreases systems certification cost, and increases overall efficiency.



High Density Fiber Ceramic Ferrule Interconnect

Page Automated Telecommunications Systems, Inc.  
240 South Whisman Road  
Mountain View, CA 94040  
(650) 230-2300  
www.patsi.com  
pat@patsi.com  
Patricia Wiener

Topic Number: N93-004 (NAVAIR)  
SBIR Investment: \$1.1M  
Project Revenue: \$864K

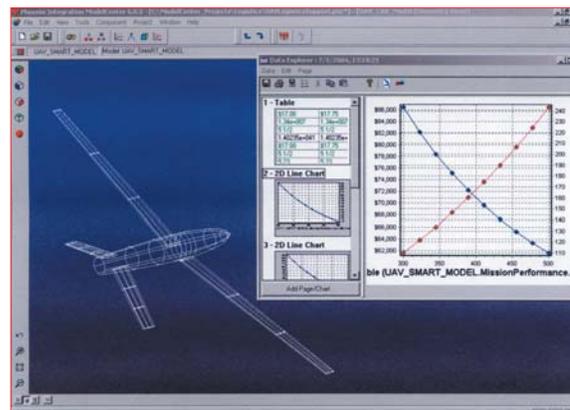
## An Integrated Design System for Weapons Subsystem Development

### ABOUT THE TECHNOLOGY

The Naval Surface Warfare Center has identified a need for a parametric, conceptual computer aided design (CAD) system for naval gun subsystem designs. The software should allow systems engineers to share information and collaborate on design projects. The level of analysis ranges from high level rule-based design to complex analysis algorithms. Phoenix Integration (Phoenix) has developed an engineering software tool that addresses these needs with a modeling interface and dynamic analysis software. The software links multiple computer programs together to afford engineers access to all design information in one application. The software integrates programs for the design and analysis of combat weapon subsystems and resolves a compatibility deficiency for ship design modules that needed weapon system concepts to be configured and analyzed in a timely manner.

### MILITARY & COMMERCIAL SIGNIFICANCE

Phoenix Integration's ModelCenter® is the commercial result of this research. ModelCenter® gives DoD the ability to rapidly develop a single, unified picture of cost, performance, and risk for the design of weapons subsystems. The modeling and analysis tool offers designers a graphical, interactive capability for creating shipboard subsystems in less time and at less expense. ModelCenter® allows for a better analysis of design alternatives. Further, a better understanding of the total system is gained from a modeling and analysis tool that creates multiple subsystems and shows the integration between each element. The system quickly simulates design performance, which provides greater insight into the model's technology. ModelCenter® enables greater competitiveness among companies by improving productivity and allowing engineers to focus on important design issues. These efficiencies reduce engineering man hours and labor cost, and helps speed products to market.



ModelCenter® Design of an Unmanned Aircraft

### APPLICATIONS

- G-33 Gun Design Group, propulsion design
- Future combat systems, conceptual design of aircraft
- Torpedo design, integrated hypersonic analysis
- Second Generation Reusable Launch Vehicles
- Aircrafts, space/missiles, satellite design
- Automotive, electronics
- Oil and gas exploration

### ABOUT THE COMPANY

Phoenix Integration is in the business of helping organizations succeed by improving R&D and decision analysis. Its software has been used by a diverse range of Fortune 500 companies to improve processes from concept evaluation to product introduction.

The Navy SBIR funding has been pivotal in allowing Phoenix to develop the exact technology needed to make the company's business successful. As an SBIR Phase III company that has successfully transitioned its technology, Phoenix has done well in attracting outside investment capital. Nine of the top ten defense contractors employ Phoenix's software to improve the development of their weapons systems. Phoenix has diversified into automotive, oil and gas, and electronics markets, with 15% of its revenue now coming from international sales.

Topic Number: N98-080 (NAVSEA)

SBIR Investment: \$646K

Project Revenue: \$5.8M

Phoenix Integration  
1715 Pratt Drive, Suite 2000  
Blacksburg, VA 24060  
(540) 961-7215  
www.phoenix-int.com  
malone@phoenix-int.com  
Brett Malone

# Sparker Acoustic Source "A" Size Sonobuoy



Sparkerbuoy TPL

## APPLICATIONS

- TAMDA sonobuoy
- Submarine countermeasures
- Anti-biofouling, such as control of Zebra mussels
- Waste water treatment
- Water disinfection
- Oceanographic data collection
- Oil/seismic exploration

## ABOUT THE COMPANY

Phoenix Science and Technology (PS&T), Inc. develops and commercializes pulsed acoustic and light sources for a wide range of applications. The company is focused on R&D, applications, prototypes and improvements of innovative technologies. NAVAIR SBIR has helped to fuel the growth of PS&T from a two person operation in 1995 at the start of Phase I to its current 11 employee company. The success of the Sparker has helped expand Sparker applications to NAVSEA and commercial clients. Together with its Surface Discharge Lamp technology, PS&T now has a strong IP position.

## ABOUT THE TECHNOLOGY

Phoenix Science & Technology (PS&T), Inc. has developed a new Sparker impulsive acoustic source as an alternative to the chemical explosives currently used as a broadband acoustic source. The Sparker is a pulsed electrical discharge with a broadband low frequency spectrum that is highly efficient in high conductivity ocean environments. It offers a safer, more controllable, environmentally benign, multiple-pulse source for under-water environmental data collection and submarine/torpedo countermeasures.

The Sparker is a part of the Tactical Acoustic Measurement and Decision Aid (TAMDA) environmental sonobuoy that collects, processes, and transmits environmental acoustic data required by the US Navy to enhance anti-submarine warfare operations in shallow water.

## MILITARY & COMMERCIAL SIGNIFICANCE

Navy explosive acoustic sources have environmental and safety implications that restricts use and impacts fleet operations. The Sparker is an electrically driven acoustic source that emits pressure pulses similar to explosives, but is safer and easier to control, thus reducing the safety and environmental concerns of explosives. Unlike explosives, Sparkers can "pinged" as many times as necessary.

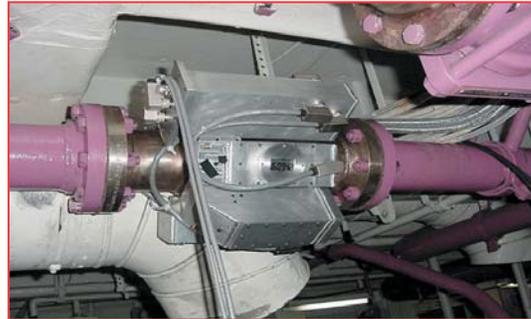
# Advanced In-Line Fuel Monitoring

## ABOUT THE TECHNOLOGY

Physical Sciences, Inc. (PSI) has developed an in-line sensor to monitor free water and sediment contamination in JP5 aviation fuel carried aboard naval ships. The Aviation Fuel Contamination Monitoring System (AFCMS) utilizes laser-scattering technology to analyze the aviation fuel as it flows through a pipe and detects between 1-50 parts per million of free water and 1-20 milligrams per liter of sediment. PSI's innovative AFCMS is being tested aboard a Navy aircraft carrier as the culmination of a three-year effort funded by NAVAIR and NAVSEA under the SBIR program.

## MILITARY & COMMERCIAL SIGNIFICANCE

The AFCMS reduces workload of fuel sampling by up to 3200 hours per month for an annual savings of nearly \$1 million per carrier. It can provide fuel sampling at commercial airports, fuel storage sites, power plants, and can aid in the automation of refinery operations. Using the AFCMS reduces total ownership costs in virtually any liquid process where water or solid intrusions in minute quantities constitute a serious problem. The technology has expanded expertise in the general area of fluid condition monitoring and has led to the development of sensors for monitoring contamination and water in hydraulic fluids and lubricating oils.



The Aviation Fuel Contamination Monitoring System (AFCMS)

## APPLICATIONS

- Air capable ships
- Carriers
- Fuel sampling by commercial airports, fuel storage sites, and power plants
- Automation of refinery operations
- Sensors to monitor contamination and water in hydraulic fluids and lubricating oils

## ABOUT THE COMPANY

Physical Sciences, Inc. has developed a successful methodology for technology transfer and commercialization. Starting with funded research and development projects, the company supports the development of prototype products and services through the pre-commercial stage. Working with major corporate partners, PSI then establishes focused commercial businesses, joint ventures or licensing arrangements that promote rapid penetration of growth markets. The SBIR program has played a pivotal role in PSI's technical and commercial success, and has been responsible for a family of intelligent instrumentation products based on proprietary electro-optical and electromechanical technologies. It has also led to the assembly of experimental, prototype development facilities at the company. PSI is actively seeking licensing opportunities and partnerships for commercial applications in fluid condition monitoring and other market segments.

Topic Number: N99-053 (NAVAIR)

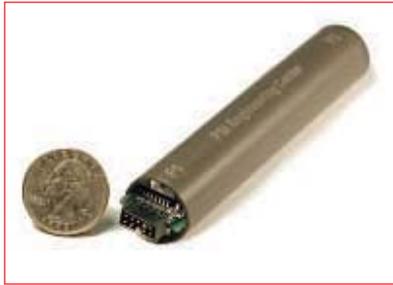
SBIR Investment: \$989K

Project Revenue: \$1.55M

Physical Sciences, Inc.  
20 New England Business Center  
Andover, MA 01810  
(978) 738-8195  
www.psicorp.com  
druy@psicorp.com  
Dr. Mark A. Druy



## ATM-Sonnet Network Node (SAKI)



ATM-Sonnet (SAKI) Network Node offers performance advantages for surveillance arrays

### APPLICATIONS

- Navy fixed deployable systems
- NATO Supreme Allied Commander Atlantic
- Underwater Deployable Acoustic Measurement System: Undersea Research Center Broadband Towed Array Sonar, MOD Wideband Towed Array Sonar
- Seismic seafloor arrays, seismic towed arrays, image sensor networks, video sensor networks, urban security, and surveillance networks

### ABOUT THE COMPANY

Planning Systems, Inc. is a diversified high-technology company, founded in 1972 and head-quartered in Reston, VA. It employs more than 300 technical staff in multiple locations nationwide. PSI provides applied science and systems engineering expertise, information technology applications and solutions, and custom products to the Federal Government and commercial clients. Fiscal year 2001 revenue was \$35 million, and revenues in FY2001 grew to \$38 million. PSI has successfully performed on more than 400 government contracts and has won numerous repeat awards with over a dozen Federal agencies. It has consistently demonstrated that it not only has the technical breadth and depth required to support mission critical activities but is uniquely qualified to do so.

### ABOUT THE TECHNOLOGY

Planning Systems used models and prototypes to demonstrate that asynchronous transfer mode (ATM) technology offers performance advantages for surveillance arrays. Several prototype components were developed to use the ATM technology. A miniature low-power ATM-Sonnet network node (SAKI) was developed that uses 1 Watt or less power, is only 0.8 inches in diameter by 4 inches long, and is tolerant to 3000 PSI. An underwater 4-port ATM switch was also developed. The switch is capable of 622 Mbps switching speeds, low power, and has configurable physical layer interfaces to support bridging networks with disparate protocols and interfaces. By leveraging recent advances in ATM telemetry, these prototypes enabled Planning Systems to build a surveillance array sensor system that maximizes the benefits of open-architecture ATM technology while solving issues such as coherent sample rate clock distribution across sensor nodes.

### MILITARY & COMMERCIAL SIGNIFICANCE

ATM technology is compatible with standard network infrastructure gear and allows a low latency for real-time applications. It provides a low-power fundamental electronic building block for sensor networks and network-centric systems. The Department of Defense and joint forces are migrating to network-centric systems (NCS). The use of sensor network systems (SNS) increases accuracy, improves operational picture, facilitates faster response, and decreases total cost of system ownership. The SAKI network node and the 4-port ATM switch enables maximum use of NCS and SNS by reducing network power, weight, and size by a factor of 10, which enables network-connectivity in space and power constrained applications.

Planning Systems, Inc.  
12030 Sunrise Valley Drive  
Reston, VA 20191-3453  
(703) 788-759  
www.plansys.com  
mhenderson@psilongbeach.com  
Mark Henderson

Topic Number: N97-156 (SPAWAR)  
SBIR Investment: \$606K  
Project Revenue: \$3.55M

## Flexible & Affordable COTS Based Tactical Weapon Simulation, Training & Maintenance

### ABOUT THE TECHNOLOGY

Historically, commercial off the shelf (COTS) software has not been widely accepted beyond signal processing and display technology nor considered suitable for sensor and weapons applications. However, Progeny Systems has proven that COTS can be utilized for unique sensor and weapons applications that meet all shipboard requirements. The Multi-Tube Weapon Simulator (MTWS) software is a stand-alone 19-inch equipment rack, based on industry standard interfaces and protocols. It uses HTML and Java supported displays and C simulation codes to allow easy operator setup and control. Progeny Systems developed MTWS to afford the U.S. Navy Submarine Force the ability to simultaneously simulate and provide training on all vertical and horizontal weapons. MTWS supports simultaneous simulation and training for the 16-Tube SALVO launch of all 4 horizontal and 12 vertical weapon tubes, as well as, current horizontal and vertical Tomahawk missiles and MK-48 ADCAP Torpedoes.

### MILITARY & COMMERCIAL SIGNIFICANCE

Progeny's MTWS improves weapon simulation and training, lowers maintenance expenditures, and provides greater savings for the Navy's submarine fleet. It is ninety percent less expensive than current simulation software. Application upgrades, weapon simulation, and training support are simple and adaptable to other Navy simulation and training platforms.



Multi-Tube Weapon Simulator (MTWS)

### APPLICATIONS

- Simulation and training
- Horizontal and vertical Tomahawk missiles
- MK-48 ADCAP torpedo

### ABOUT THE COMPANY

Since incorporation in 1995, Progeny Systems Corporation has provided high quality engineering services to the United States Navy, Air Force, DARPA and corporate customers. In August of 1996, Naval Sea Systems Command awarded Progeny its first Small Business Innovative Research (SBIR) contract. Since then, Progeny has performed numerous SBIR contracts for the Navy, Air Force, and DARPA. Many of these contracts involve leveraging commercial technologies (e.g., Internet and COTS products) into special customer applications, reducing life cycle cost and improving system performance. Progeny Systems attributes a significant amount of its growth to the MTWS and the Navy SBIR programs. Over the past three years, the company has increased to about 190 employees.

Topic Number: N98-122 (NAVSEA)

SBIR Investment: \$668K

Project Revenue: \$4.2M

Progeny Systems Corporation  
9500 Innovation Drive  
Manassas, VA 20110  
(703) 368-6107  
www.progeny.net  
mredde@progeny.net  
Mike Redden



# Intelligent Agent Security Module (IASM)



IASM “watches” network traffic on many levels to determine misuse

## ABOUT THE TECHNOLOGY

IASM is a high-speed secure distributed agent based system, operating as a single analytical and statistical processor, which connects agents gathering network information from many contractor and government off-the-shelf sources. IASM “watches” network traffic on many levels to determine misuse, fraud, or attack. Information is analyzed at the agent level, normalized and fused as it is sent to multi-level IASM servers. The data is correlated and analyzed further to determine cyber attack profiles in real time. Results are translated into simple English, for Navy watch standers and centralized analysts, to help them monitor the electronic terrain of their global networks.

## APPLICATIONS

- Fleet Network Operating Centers
- Navy Component Task Force
- SPAWAR Systems Center Labs
- Aircraft carriers and Flag command ships
- Commercial versions of the IASM product are available as a security Internet appliance

## MILITARY & COMMERCIAL SIGNIFICANCE

Analytic capabilities can now accurately identify, source, and isolate cyber attacks. The IASM system reduces false positive network intrusion alerts to less than 1 percent and improves identification of network attacks by 64 percent. The system provides accurate and timely situation awareness, and delivers better forensic analysis, data reduction, graphic display reporting, and incident response. The technology detects novel non-signature attacks with cluster attack analysis and anomalous intrusion detection.

## ABOUT THE COMPANY

PROMIA is a leading developer and supplier of distributed object and component security tools that are based on open standard components with advanced analytic capabilities. Its products are used in environments requiring high security, high reliability, high performance and scalability. Since the early 1990’s PROMIA has been in the forefront of developing software infrastructure solutions based on object oriented technology and open standards for organizations worldwide.

PROMIA, Inc.  
160 Spear Street #320  
San Francisco, CA 94105  
(415) 536-1600  
www.promia.com  
john.mullen@promia.com  
John Mullen

Topic Number: N99-167 (SPAWAR)  
SBIR Investment: \$800K  
Project Revenue: \$7.6M



## Secure Internet Protocol (IP) Multicast (SIM)

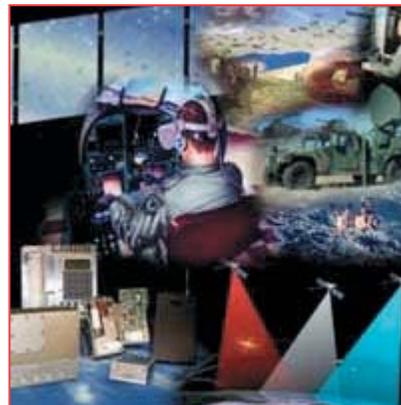
### ABOUT THE TECHNOLOGY

Scientific Research Corporation (SRC) developed a secure internet protocol (IP) multicast (SIM) solution that is compatible with existing Navy shipboard networks and various voice compression algorithms. The result is a robust combination of voice quality and bandwidth utilization for the Navy's wireless environment. SRC's software-based SIM solution combines the bandwidth efficiency of multicast with the confidentiality of IP security (IPsec) for need-to-know separation in a security domain. Multicast group management provides scalable, secure, and manageable data networking for Type 1 encrypted traffic - common for inter-ship tactical wireless links. The SIM architecture enables centralized network administration by separating the process-intensive operations of traffic encryption and key management.

### MILITARY & COMMERCIAL SIGNIFICANCE

SIM enhances support of confidential group communications by combining non-reputable multicast group membership, source authentication, and data-encryption key generation.

Military grade IPsec encryption (Type 4 ciphers) provides confidentiality that is transparent to user applications. Its public key infrastructure, common access cards, and multicast key distribution enable robust key and group management.



SRC's secure internet protocol multicast solution is compatible with existing Navy shipboard networks

### APPLICATIONS

- Integrates with legacy Navy communication networks such as Secure Voice-21 Gateway
- Interfaces with commercial routers, low-rate radio frequency modems, multiplexers, hardened phones and wireless handsets
- Enables multicast in secure IP networks

### ABOUT THE COMPANY

SRC is a provider of high-tech products and services to government and commercial customers requiring innovative communications, signal intelligence and radar systems. SRC's networking expertise includes wireless communications, mobile ad-hoc networking, quality of service policy management, security/key management, hardware-in-the-loop simulations, and covert waveform development.

Topic Number: N99-172 (SPAWAR)

SBIR Investment: \$700K

Project Revenue: \$2.25M

Scientific Research Corporation (SRC)  
2300 Windy Ridge Parkway, Suite 400 S.  
Atlanta, GA 30339  
(978) 604-4353  
www.scires.com  
rfigucia@scires.com  
Robert Figucia



# Individual Chemical Alarm System (ICAS)



Chemical Detection Badge

## APPLICATIONS

- Military: Personal protection; integration into existing systems - helmets, masks, sensor suites
- Homeland Security: Coast Guard, Customs, Border Patrol
- First responders: Police, Fire and HazMat Teams
- Industrial: individual protection for hazardous chemicals; leak monitoring

## ABOUT THE COMPANY

Smiths Detection - Pasadena, formerly Cyrano Sciences, Inc., is focused on providing chemical and biological sensors and software solutions for defense, homeland security, industrial and commercial markets. Since 1997, Smiths Detection-Pasadena has directed its efforts to creating low cost, low power chemical sensors and sensor systems that are capable of capturing and interpreting data, providing real time notification and information as needed. Based on technical success with the chemical detector badge, Smiths Detection-Pasadena has acquired significant additional funding for commercialization into other military and civilian sectors.

## ABOUT THE TECHNOLOGY

Smiths Detection - Pasadena developed a wearable personal protective badge that continuously monitors the atmosphere for chemical threats. The badge utilizes a low cost and low power nanocomposite sensor array to detect the presence of chemical threats in the air. The sensor array is rugged and the response is repeatable enabling multiple measurements. The sensor array is highly sensitive to chemical warfare agents and toxic industrial chemicals. The badge produces audible and visual alarms when a chemical threat is detected. The Marine Corps anticipates using this technology for personal protection.

## MILITARY & COMMERCIAL SIGNIFICANCE

Smiths Detection - Pasadena's badge monitors, detects and notifies individual wearers of exposure to a chemical threat. No user interaction is required. This provides each individual with early warning and a margin of safety to don protective gear. Data is logged continuously for validation and verification and can be downloaded to a computer for archiving and analysis.

The badge is a true dual use technology and is ideally suited for protecting personnel in a variety of security and industrial settings. Sensor arrays can be manufactured for specific purposes and interchanged and chemical libraries updated for new or expanded threats. Future versions of the badge for civilian use will include wireless networking to report and record exposures in real-time over LAN/WAN systems.

**Smiths Detection – Pasadena**  
73 N Vinedo Avenue  
Pasadena, CA 91107  
(877) 744-1700  
[www.smithsdetection.com](http://www.smithsdetection.com)  
[timothy.burch@smithsdetection.com](mailto:timothy.burch@smithsdetection.com)  
Timothy Burch

**Topic Number: CBD02-203 (MARCOR)**  
**SBIR Investment: \$680K**  
**Project Revenue: \$3M**

# Acoustic Analysis Intelligent Tutoring System (AAITS)

## ABOUT THE TECHNOLOGY

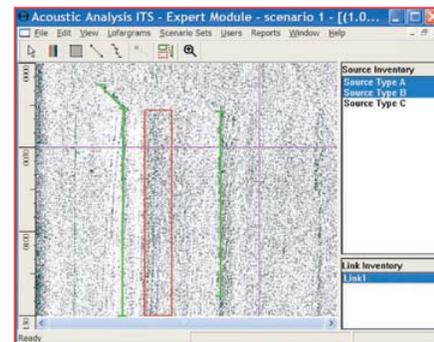
AAITS is an artificial intelligence tutoring system developed for naval sonar technicians. The software teaches trainees how to analyze acoustic signals in order to detect and classify undersea and surface targets. AAITS uses artificial intelligence to evaluate students' performance and provide immediate feedback. By simulating scenarios realistically, the intelligence tutoring system provides students with considerable experience at a fraction of the cost of other training methods.

## MILITARY & COMMERCIAL SIGNIFICANCE

Developing the skills needed to detect and classify undersea vessels requires extensive practice in sonar data analysis, instruction from experts, and individualized feedback. The scarcity and cost of expert instructors and the large number of students requiring individualized tutoring made it difficult to provide extensive scenario-based training. The lack of real-world learning opportunities was also an impediment. By automating the evaluation of each student's analysis, AAIT enables instructors in large classroom settings to provide students with more practice-based learning, in less time. AAITS can be used to maintain organizational expertise in undersea acoustic analysis.



Sonar Control



AAITS Tutoring System

## APPLICATIONS

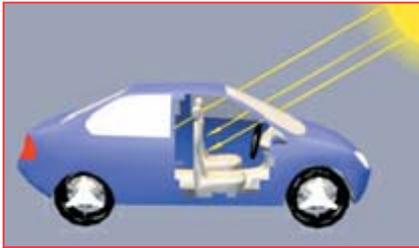
- Navy (DoD) education and training (employed at eleven sites)
- Medical imaging
- Homeland security (e.g., baggage screening)
- Aerial and satellite images for intelligence, damage assessment, and earth science research

## ABOUT THE COMPANY

Founded in 1988, Stottler Henke Associates, Inc. applies artificial intelligence and other advanced software technologies to solve problems that defy resolution using traditional approaches. The company delivers intelligent software solutions for education and training, planning and scheduling, knowledge management and discovery, decision support, and automated computing. Stottler Henke's clients include manufacturers, retailers, educational media companies and government agencies.



## Ray-Tracing Tool Optimized for Pro/E Geometry



Ray Tracing Tool Optimized for Pro/E

### APPLICATIONS

- Vulnerability assessment: Future Combat System Army, AAV Marines, DD(X) Navy
- Solar Loading through Glass for Thermal Analysis (Military and Commercial ) to design efficient climate control systems
- Enhanced Ray-Tracer for IR Signature Code to produce faster speeds and higher accuracy analysis
- Pro/E Plug-in for Thermal and IR Signature codes (Military and Commercial) increases the efficiency of thermal management design
- BRL-CAD to STEP Converter
- Ray-Tracer to be used in computing Plume Radiance
- Mesh mapper for mapping Hi-Res CFD to Lo-Res Thermal

### ABOUT THE COMPANY

ThermoAnalytics, Inc. has established itself as a leading infrared modeling and software development company that provides software and services to both commercial and government customers. Derivative software from the raytracing tool has resulted in additional consultation on modeling, analysis, and signature management design from Northrop Grumman Ship Systems for the DDX program. ThermoAnalytics recently developed a new mesh mapper for mapping Hi-Res CFD to Lo-Res Thermal that has become a major commercial feature of its latest commercial software release. Revenue generated from the SBIR effort has broadened the technology base and has helped the company achieve 25% annual growth in sales and staffing.

### ABOUT THE TECHNOLOGY

Current state-of-the-art survivability assessment software uses a Computer Aided Design (CAD) to generate 3D target descriptions of model threat penetration and damage. A “ray tracing” program is used to simulate the target/threat interaction by taking a ray and passing it through a target to produce geometric intersections between the ray and the target. Standard vulnerability tools depend on a single ray tracer that requires the program be in Ballistic Research Laboratory Computer Aided Design (BRL-CAD) constructive solid geometry format. In general, designers and analysts employ commercial CAD packages that typically use a boundary representation to represent solid geometry. The conversion of the geometry from a commercial Pro/ENGINEER format into a BRL-CAD format is an extensive effort and sometimes produces results that are not optimal for vulnerability assessment.

ThermoAnalytics developed a ray tracing tool that uses an open and standard interface to directly interrogate the Pro/ENGINEER geometry, as well as, other CAD packages that support the STEP (STandard for the Exchange of Product model data) file format. The tool eliminates the need to perform geometry conversions to BRL-CAD format. It supports not only vulnerability assessment needs, but signature and reparability assessments, and many other commercial applications.

### MILITARY & COMMERCIAL SIGNIFICANCE

The capability to directly interrogate Pro/ENGINEER geometry produces significant savings in the time and effort required to perform survivability assessments. The ray-tracing tool enhances the accuracy of performing functions, such as Solar Loading through Glass for Thermal Analysis.

ThermoAnalytics, Inc.  
23440 Airpark Blvd, P.O. Box 66  
Calumet, MI 49913-0066  
(906) 482-9560  
www.ThermoAnalytics.com  
Keith.Johnson@ThermoAnalytics.com  
Keith Johnson

Topic Number: N99-0198 (MARCOR)  
SBIR Investment: \$850K  
Project Revenue: \$500K

## Manufacturing of Designed Carbon Foams for Naval Structures

### ABOUT THE TECHNOLOGY

Touchstone Research Laboratory developed a carbon foam structural material made from coal, called CFOAM® that uses carbon foam as a technology platform for shipboard applications. CFOAM is inexpensive, lightweight, fire-resistant, impact-absorbing, and can be thermally insulative or conductive. Its electrical resistivity can be varied over nine orders of magnitude. This versatile, next-generation material has been produced in a variety of forms from thin sheets to near-net-shape 3D components. The material can be cut, milled, turned, etc., with conventional equipment and tooling. CFOAM can accommodate metalized coatings using flame-spray techniques, allowing fasteners to be readily attached. Integration with other materials, including impregnation with phenolic or other resins or laminates, can be accomplished using commercially available equipment.

### MILITARY & COMMERCIAL SIGNIFICANCE

CFOAM's versatility as a technology platform in support of Navy projects is wide-ranging. Serving as an ideal replacement for materials like balsa wood, polystyrene foams, steel and composites, the benefits of Touchstone's carbon foam include: low density, excellent thermal and fire protection, ballistic protection, electromagnetic interference (EMI) shielding, light weight, corrosion resistance, high mechanical strength, acoustic and thermal insulation, tailorable signature characteristics, and low toxicity.

CFOAM can replace a variety of materials in the commercial market including steel, aluminum, titanium, composites, ceramics, carbon, graphite, concrete, plastics, fiberglass, fire brick, fiberboard and more. CFOAM is an ideal composite tooling material due to its low coefficient of thermal expansion.



CFOAM

### APPLICATIONS

- Ships: reduced radar signature deckhouse and island structures
- Aircraft carriers: jet blast deflectors
- Bulkheads and decks: thermal, fire and ballistic protection in high-risk fire zones
- Aerospace: rocket motors, heat transfer systems, radar and antennae systems
- Energy: heat exchangers, fuel cells, battery electrodes, and electrochemical cells
- Automotive: catalytic converters, crush zone capsules, brakes, and bumpers
- Home and commercial building: insulation, fire blocks, ceiling tiles, and prefab walls
- Carbon foam propulsion, radar & composite manufacturing

### ABOUT THE COMPANY

Touchstone Research Laboratory is a woman-owned metals and materials research and development firm. Touchstone's engineering staff works in the areas of product and process development, industrial problem solving, materials testing services, applied materials R&D, and special test equipment. Since 1998, Touchstone has been awarded a number of SBIR Phase I, II, and III awards in several technology areas. Twice a winner of the Tibbetts Award for exemplifying the very best in SBIR achievement, Touchstone has more than doubled its size in the last six years. In September 2004, R&D Magazine recognized Touchstone's CFOAM as one of the 100 most technologically significant products introduced into the marketplace last year.

Topic Number: OSD98-043 (ONR)

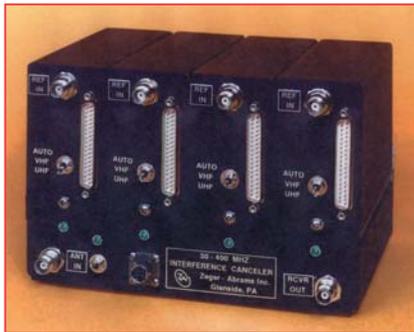
SBIR Investment: \$850K

Project Revenue: \$11.1M

Touchstone Research Laboratory  
The Millennium Centre  
Triadelphia, WV 26059-9707  
(304) 547-5800  
www.trl.com  
www.cfoam.com  
cfoaminfo@trl.com  
R. Andrew Guth



## Cosite Interference Mitigation Device



Frequency Hopping Adaptive Interference Canceler (HAIC)

### ABOUT THE TECHNOLOGY

As telecommunication systems grow in complexity, more and more antennae and radios using legacy and wide band waveforms are being placed upon a single ground vehicle, ship or aircraft. The resultant interference due to coupling between transmitting and/or receiving elements can stress the operation and integrity of the platform's crucial communications navigation and radar systems. This problem is called cosite interference. Cosite interference can corrupt signals with noise, deteriorating the quality of communications. It also can cause jamming and result in complete interruption of already established communications. The three causes of cosite interference are: (1) high power transmit signals that overload the linear range of the receiver; (2) transmitter noise and spurious sidebands entering the receiver; and (3) nonlinear intermodulation products created from the transmitter signal entering, or generated in, the receiver and other transmitters. Zeger-Abrams Incorporated (ZA) has developed a multifaceted approach combining RF adaptive interference cancellation, and RF filtering to greatly minimize all three of these cosite interference mechanisms, even under the severest conditions.

### APPLICATIONS

- Marine Corp: AAV (now EFV) and AAV radio suites
- Navy: JTRS radios, on-board radar systems
- SINCGARS radios on Bradley, Abrams M-1 Tank
- AN/ARC-210 radios on Hawkeye E2-C, Growler EF-18G, F-14, A-10
- Amphibious and land combat platforms

### ABOUT THE COMPANY

Since its founding in 1977, Zeger-Abrams Inc. (ZA) has been developing and applying advanced signal processing techniques, with emphasis on the simultaneous suppression of radio frequency interferences (RFI) and enhancement of desired signals. As part of and in addition to its work in the field of cosite interference mitigation, ZA has expertise in RFI suppression, adaptive nulling antenna arrays, communications and radar, ECCM, direction finding and navigation, power amplifier adaptive linearization, co-channel spectrally-overlapping signal separation, multipath signal component suppression, spread spectrum multiple access CDMA communications, and ultrasonic detection and location of cracks developing inside pipe walls.

### MILITARY & COMMERCIAL SIGNIFICANCE

ZA's Cosite Interference Mitigation Device (CIMD) is a ruggedized interference minimization system developed for the AAVC7A1 and other military amphibious and land combat platforms. The CIMD allows such vehicles to operate multiple modern frequency-hopping radios with minimal degradation to voice and data reception due to cosite interference. The CIMD offers gains both for VHF SINCGARS waveforms and for UHF HAVE QUICK and SATCOM waveforms. The CIMD design has the additional advantage of reducing the number of vehicle-mounted antennas from eleven to five. The CIMD has wide application and provides the Navy with a blueprint for the management of cosite interference on its ground vehicles, ships, and airborne platforms for existing VHF and UHF radios, the new JTRS radios, EMC and on-board radar systems as well.

Zeger-Abrams Inc.  
1112 Clark Road  
Glenside, PA 19038-7504  
(215) 576-5566  
[www.erols.com/zeger](http://www.erols.com/zeger)  
[zeger@rcn.com](mailto:zeger@rcn.com)  
Andrew E. Zeger

Topic Number: N97-002 (MARCOR)  
SBIR Investment: \$850K  
Project Revenue: \$1.7M

## Navy SBIR Program Managers

### Acting SBIR Program Manager STTR Program Manager

John Williams  
(703) 696-0342  
williajr@onr.navy.mil

### Marine Corps Systems Command

Paul Lambert  
(703) 432-3502  
lambertpa@mcsc.usmc.mil

### Naval Air Systems Team

Carol Van Wyk  
(301) 342-0197  
carol.vanwyk@navy.mil

### Naval Sea Systems Command

Janet Jaensch  
(202) 781-3728  
jaenschjl@navsea.navy.mil



### Office of Naval Research

Cathy Nodgaard  
(703) 696-0289  
nodgaac@onr.navy.mil

### PEO C41 & Space/SPAWAR

Linda Whittington  
(858) 537-0146  
linda.whittington@navy.mil



## Naval Air Systems Team

### Deputy Program Manager

Janet McGovern  
(301) 342-0215  
janet.mcgovern@navy.mil

### Program Liaison

Kim Berche  
(301) 342-0213  
kimberly.berche@navy.mil

### Transition Manager

Jerry Rubinsky  
(301) 342-9355  
jerry.rubinsky@navy.mil

### Information, Simulation & Modeling

Thomas Franz  
(407) 380-8393  
thomas.franz@navy.mil

### Weapons Division

Bill Webster  
(760) 939-1074  
willard.webster@navy.mil

## **Naval Sea Systems Sponsors and Representatives**

### **NAVSEA Directorates**

Gail Williams  
(202) 781-3757  
williamsge@navsea.navy.mil

### **PEO-Carriers**

John Nunnery  
(202) 781-0772  
nunneryjs@navsea.navy.mil



### **PEO-Ships**

Dr. Richard Vogelsong  
(202) 781-2638  
vogelsongrd@navsea.navy.mil

### **PEO-Integrated Warfare Systems (IWS)**

Douglas Marker  
(202) 781-1955  
markerdj@navsea.navy.mil

### **PEO-Littoral & Mine Warfare (LMW)**

Paul Hagan  
(202) 781-0617  
haganfp@navsea.mil

### **PEO-Submarines**

Richard McNamara  
(202) 781-4002  
mcnamararr@navsea.navy.mil

## **Naval Sea Systems Warfare Centers**

### **Naval Surface Warfare Center/Carderock**

James Wood  
(301) 227-2690  
woodje@nswcc.navy.mil

### **Naval Surface Warfare Center/Crane**

Brooke Pyne  
(812) 854-3310  
pyne\_e@Crane.navy.mil

### **Naval Surface Warfare Center/Indian Head**

Nancy Johnson  
(301) 744-2575  
johnsonnc@nswcihmid.ih.navy.mil

### **Naval Surface Warfare Center/Crane**

John Dement  
(812) 854-4164  
dement\_john@Crane.navy.mil

### **Naval Surface Warfare Center/Dahlgren**

Joe Garcia  
(540) 653-6950  
garciajp@nswc.navy.mil

### **Naval Undersea Warfare Center/Newport**

Jack Griffin  
(401) 832-7283  
griffinjf@npt.nuwc.navy.mil

## **Additional Program Managers**

### **Naval Facilities Engineering Command**

Nick Olah  
(805) 982-1080  
nick.olah@navy.mil

### **Strategic Systems Program Office**

Charles Marino  
(202) 764-1553  
charles.marino@ssp.navy.mil

### **Naval Supply Systems Command**

Joe Gaines  
(717) 605-3405  
joe.gaines@navy.mil

## MARCOR

Areté Associates. . . . .	4
Smiths Detection - Pasadena (formerly Cyrano Sciences, Inc.) . . . . .	32
ThermoAnalytics, Inc. . . . .	34
Zeger-Abrams Inc.. . . . .	36

## NAVAIR

ATK Composites (formerly Composite Optics, Inc.). . . . .	6
Bodkin Design & Engineering, LLC. . . . .	7
Coherent Technologies, Inc.. . . . .	8
Combustion Research and Flow Technology (CRAFT Tech). . . . .	9
Mathtech, Inc.. . . . .	16
Multispectral Solutions, Inc.. . . . .	17
Navmar Applied Sciences Corp.. . . . .	19
Page Automated Telecommunications Systems, Inc.. . . . .	24
Phoenix Science & Technology, Inc.. . . . .	26
Physical Sciences, Inc.. . . . .	27

## NAVSEA

21st Century Systems, Inc. . . . .	1
Applied Hydro-Acoustics Research, Inc.. . . . .	2
Applied Ordnance Technology, Inc.. . . . .	3
Noesis, Inc.. . . . .	21
Phoenix Integration. . . . .	25
Progeny Systems Corp.. . . . .	29

## ONR

Diversified Technologies, Inc.. . . . .	10
EIC Laboratories, Inc.. . . . .	11
HYPRES, Inc.. . . . .	12
Materials Systems Inc. . . . .	15
Native American Technologies Company. . . . .	18
nGimat Company (formerly MicroCoating Technologies). . . . .	20
Ocean Power Technologies, Inc.. . . . .	23
Touchstone Research Laboratory. . . . .	35

## SPAWAR

Argon Engineering Associates, Inc.. . . . .	5
Innovative Technology Associates. . . . .	13
Makai Ocean Engineering, Inc.. . . . .	14
Nova Engineering, Inc.. . . . .	22
Planning Systems, Inc.. . . . .	28
PROMIA, Inc.. . . . .	30
Scientific Research Corp.. . . . .	31
Stottler Henke Associates, Inc.. . . . .	33

*T*his publication is sponsored by the Navy's SBIR/STTR program.

The content does not necessarily reflect the position or policy  
of the Department of the Navy or the Federal Government;  
no official endorsement should be inferred.

**The Success Book was produced by DJA & Associates**  
**[www.djaandassociates.com](http://www.djaandassociates.com)**



**Office of Naval Research**

ONR 364, SBIR/STTR Program  
800 North Quincy Street  
Arlington, VA 22217-5660

---

For more information on the Navy SBIR/STTR Program, please visit the website at  
[www.navysbir.com](http://www.navysbir.com) or [www.onr.navy.mil/sbir](http://www.onr.navy.mil/sbir)

or visit the ONR homepage at  
[www.onr.navy.mil](http://www.onr.navy.mil)