

Hansen, Andrew

From: Nilesen Gokay [ngokay@innovainc-usa.com]
Sent: Friday, October 23, 2009 10:14 AM
To: OTFSP2010
Cc: turk81953@aol.com; 'Dee'; Joseph.Haus@notes.udayton.edu; larrell@IDCAST.com; 'Brunner, Gary'
Subject: 2010 OTFSP LOI
Attachments: INNOVA PROPOSED PROJECT SUMMARY.pdf

Dear Sir/Madam:

Please accept this email and attachment as Innova, Inc.'s Letter of Intent to submit a proposal for the Ohio Third Frontier Sensors Program.

Lead Applicant: Innova, Inc. (www.innovainc-usa.com)
130 Westpark Road
Centerville, Ohio 45458
937-436-1064 (phone)
937-436-2355 (fax)

Contact person: Cem Gokay
Email: turk81953@aol.com

Proposed Project Title: **Scalable, Miniaturized, Low Cost Solid State Laser Systems for Sensor Applications**

Estimated Grant Funds to be requested: \$800,000 - \$850,000

Collaborators: Institute for Development Commercialization of
Advanced Sensor Technology (IDCAST) (www.idcast.com)
Ladar and Optical Communication Institute (LOCI) (www.loci-ud.com)

FLIR Systems, Inc./D-Diode, LLC (www.gs.flir.com) and
(www.ddiode.com)

ZEISS South Africa (ZOSA)
(www.smt.zeiss.com/C1257088004A21CA?Open)

Innova's Executive Vice President (Cem Gokay) will be the principal investigator for the proposed project. Mr. Gokay worked at The University of Dayton Research Institute (UDRI) for over six years prior to forming CJ Laser Corporation (Innova's predecessor). Innova was formed in 1994 when Quantel/Big Sky Laser Technologies purchased CJ Laser Corporation due to its patents on diode-pumped laser technologies.

Innova's relationship with FLIR Systems, Inc. resulted in formation of a Joint Venture (D-Diode, LLC) between Innova and FLIR in 2008 to introduce its patented high power laser diode modules for defense, homeland security, industrial, and medical application markets. This relationship resulted in FLIR becoming a member of LOCI. Currently, FLIR is in the process of establishing an office in Dayton, Ohio.

ZEISS South Africa is currently working to establish US content manufacturing capabilities in partnership with Innova and FLIR/D-Diode. Based on this relationship, Innova has been recognized and has been funded by the Dayton Development Coalition's Entrepreneurial Signature Program for the initial laboratory demonstration of the capabilities of the "technology framework" which laid the groundwork for the proposed project. IDCAST and LOCI will be Collaborators in this project offering their past experience managing any similar projects.

10/27/2009

A one page summary of the proposed project is attached.

Nilesen Gokay
President

INNOVA INC.
A Certified Woman Owned Business
130 Westpark Drive
Centerville, OH 45459
937-436-1064 Office
ngokay@innovainc-usa.com

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10/27/2009



**OHIO THIRD FRONTIER SENSORS PROGRAM PROPOSED PROJECT
"SCALABLE, MINIATURIZED, LOW COST SOLID STATE LASER SYSTEMS
FOR SENSOR APPLICATIONS"**

Miniaturization and the cost reduction of electronic warfare equipment is an expanding field especially with the expanded use of unmanned vehicles. Such electronic equipment includes sensors (cameras, illuminators, designators, rangefinders, stabilized gimbals, etc.). Multiple technology adaptation projects for product commercialization have already been identified by Innova, Inc. (lead applicant) and its collaborators (IDCAST and LOCI). Using the Technology Commercialization Framework we will propose a "Scalable, Miniaturized, Low Cost Solid State Laser Systems for Sensor Applications" project to commercialize the framework of a product that can serve multiple military and non-military markets.

Current solid state lasers that support military illuminator and designator markets are very large (10 in³), heavy (in the order of tens of pounds) and cost hundreds of thousands of dollars. Innova currently has demonstrated devices less than one pound with performance capabilities much more suitable for camera illuminators and/or UAV designator applications. Innova with its Joint Venture with FLIR Systems (D-Diode) already owns multiple IP's through patents allowed or pending on the framework of the technology. The proposed project goals, objectives, technical approach, work plan, deliverables are listed below:

- Take the current laboratory model and convert it into customer driven (IDCAST companies) product solutions such as a camera illuminator and/or designator with an estimated first prototype within 12 months.
- Within 20 months, finalize production documentation and create additional opportunities with other customers such as ZEISS SA, FLIR Systems, or Boeing for other military electronic warfare applications such as designators.
- Innova and its collaborators will use the already proven laboratory technology framework for this commercialization/packaging effort.
- The project will produce one prototype and two deliverable units where 1-3 prospect customers with future purchasing requirements will be served.

The size of the opportunity within 12 months following the conclusion of the proposed project will include, but is not limited to:

- Illuminator military markets
- Designator military markets
- Scaled up high energy laser military markets
- Scaled down eyesafe lasers for military markets
- Scaled down commercial markets, such as optical communications, wind sensing and anti-collision sensing.

Innova, a certified woman owned business, has been awarded SBIR and other government agency contracts in the past. The company's accounting practices have passed DCAA audits. Although this would be the first project for the ODOD Third Frontier Program, Innova, IDCAST and LOCI possess the experience and expertise to manage and successfully complete and produce the product for multiple markets intended within budget.

We are looking forward to receiving acceptance as one of the contenders for a Third Frontier Program and receiving a LOI identification number in preparation of submitting our proposal.

Nilesen Gökay
President

Hansen, Andrew

From: hongyan he [hehongyan1974@gmail.com]
Sent: Monday, October 26, 2009 2:08 PM
To: OTFSP2010
Subject: 2010 OTFSP LOI
Attachments: Project Summary.doc

Dear OTF:

I am writing to inform OTF of our intent to submit a 2010 OTFSP proposal in response to the recent announcement of RFP.

1. The Lead Applicant:
BioLOC LLC.
2. Contact person: Dr. Hongyan He
1381 Kinnear Rd. Suite 100
Columbus, Ohio 43212
Phone: 614-329-1394
Email: hehongyan1974@gmail.com
3. Project title: Microfluidic ELISA System
4. Estimation of Fund Requested: \$350,000
5. Known collaborators:
TEC Institute, Fisher College of Business, The Ohio State University will provide incubation and managerial services for the new venture including interim executive leadership, administrative oversight, fund raising support, and technical and business development.
Advanced Research Technologies will provide market development and technology evaluation services.
RITEK will mold CDs and lids for the project at a highly discounted charge.
Everfavor will design, fabricate and test the analyzer system and the automated sample-handling system by charging only the material and labor cost.
6. NSF has wired \$416,759 (\$122,576 on 12/01/06, \$98,061 on 08/07/07, \$98,061 on 04/14/08 and \$98,061 on 10/06/08) to BioLOC before November 2008. Since NSF funding is based on expense reimbursement, our attached statements verify that BioLOC has spent more than 75% of the SBIR Phase II grant (\$490,000) before December 10, 2009.
7. A project summary has been attached in this email.

Thank you for your help in administering this request,

Sincerely,

Hongyan He, Ph.D.

10/27/2009

Project Summary

Miniature medical systems such as 'lab-on-a-chip' (LOC) devices and advanced drug delivery systems are a rapidly-growing market, with annual sales of >\$20 billion and a high growth rate. Currently, the most prominent market niche is genetic, protein, and immunoassay analyses for pharmaceutical development. Applications on the horizon include advanced medical diagnostics and therapy, toxicology, and homeland security. Although microarray and microfluidic biosensors/chips have reached commercialization in recent years, highly automatic and efficient devices that can be mass produced at low-cost are still very few on the market.

We propose to commercialize a novel and affordable proteomic biochip system for rapid disease detection, diagnosis and therapy by leveraging the existing technical strengths in BioMEMS and polymer/biomaterial engineering at the Ohio State University. Product development and commercialization will be carried out by the start-up company, BioLOC focusing on a fully automated Compact Disc (CD)-Enzyme-Linked ImmunoSorbent Assays (ELISA) protein detection and diagnosis system for a combined US market of over \$1B annually, OSU's Center for Entrepreneurship and the Technology Entrepreneurship and Commercialization Institute will provide business support and business project management for the proposal team. BioOhio, located at TechColumbus, will also support integration of BioLOC into the emerging Ohio biotechnology market.

This disc-like biochip system is built on patented nanobiotechnology platforms developed in the Center for Affordable Nanoengineering of Polymeric Devices (CANPBD) at OSU. The CD based immunoassay chips are a joint project with several Ohio and non-Ohio companies including world largest CD producer, RITEK. BioLOC has developed the total instrumentation, including an inexpensive CD-ELISA chip and a highly automated analyzer. For this system, the proposed RCP research and commercialization efforts will focus on β -testing at OSU's Medical School and Hospital, and further data generation for both non-clinical and clinical applications with the ultimate goal of pushing these products close to market entry.

In summary, a multidisciplinary collaboration with OSU and Ohio and non-Ohio biotechnology companies will allow BioLOC to convert a number of 'demonstrating to market entry' technologies into new products for the >\$2B/yr. well-defined medical and pharmaceutical device markets, and facilitate job creation in Ohio.



Department of Biomedical Engineering
10900 Euclid Avenue, Cleveland, Ohio 44106

November 1, 2009

Ohio Third Frontier
Ohio Department of Development
Technology Division
77 South High Street, 25th Floor
Columbus, OH 43215-6130

Re: FY2010 Ohio Third Frontier Sensors Program

Ohio Department of Development:

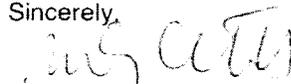
This letter is to state the intent of the Case Western Reserve University, in conjunction with the partners listed below, to jointly produce and file a full proposal in response to the OTF Request for Proposal released on October 7, 2009.

1. Title: Advanced BioMedical Sensor Array Platform for High-Throughput, Low Cost Drug Development
2. Contact Person: Miklos Gratzl, Ph.D
 Department of Biomedical Engineering
 Case Western Reserve University
 Cleveland Ohio, 44103
 216-368-6589 phone
 216-368-4969 fax
 email: miklos.gratzl@case.edu
3. Lead Organization: Case Western Reserve University
4. Legal Structure: Institution of Higher Education, Corporation for Non-Profit, State of Ohio
5. Estimated funds to be requested: \$1 million
6. Collaborating Organizations (as of 10/27/2009):

MicroFabrication Solutions, Inc
Orbital Research Corporation
Invenio Therapeutics, LLC
Lorain County Community College

We look forward to submitting a full project proposal to the Third Frontier program in December.

Sincerely,


Miklos Gratzl, PhD

Department of Biomedical Engineering
Case Western Reserve University
216 368-6589
miklos.gratz@case.edu

Advanced BioMedical Sensor Array Platform for High-Throughput, Low Cost Drug Development

Summary The long term goal of the present proposal is to develop a product line that will close the gap that currently exists between cell-based assays and animal testing in drug development. The devices will have arrays of microscopic chemical sensors fabricated with MEMS technology. The sensors will measure drug penetration and vital metabolic parameters in 3D multicellular tumor models consisting of thousands of tumor cells. The data obtained will make it possible to select those compounds from the large number of initial hits identified by cell-based assays that show effective anticancer activity in tumor-like microenvironments. Only compounds that tested positive by the developed devices will then be tested in animals. The proposed technology will reduce the amount of animal testing needed to develop a clinically useful drug by effective pre-selection of the molecules that are promising not only in cell-based assays but also in tumor-like constructs. The inventions that form the basis of the proposed technology make it possible to perform the pre-selection with high throughput and at low labor costs. There is no other technology that could fill the currently existing gap between traditional cell-based screening and animal testing. The pharmaceutical industry will be able to save time and costs required to develop clinically successful anticancer agents by adopting the technology proposed here. In the present proposed work first-generation experimental devices will be made and tested for measuring drug penetration, oxygenation and acidity at different depths of the multicellular tumor model. The measurement of further parameters can be added in the future.

Background and main concepts Though there are a large number of methods utilized to screen for novel cancer therapeutics, there is a need for a new strategy that involves the applications of a tumor microenvironment monitoring platform in this process. In typical drug screening, a specific target molecule or cellular process is identified to be modified by a drug. Next a high-throughput screen is set up in a multi-well plate format (often 96 or 384 well plates) in which large small-molecule libraries of "drug-like" compounds (10's or 100's of thousands of compounds) are tested for their ability to affect the desired target. This primary screen typically results in a large number of initial "hits." For example, we typically observe approximately a ~0.5% hit rate with our cell-based assay used to identify leukemia differentiation compounds that would lead to approximately 250 hits after screening 50,000 compounds. At this point in the drug discovery process it is often extremely difficult to optimally select the desired compounds for further study. In practice, secondary screens are usually performed to confirm the "hits" as well as determine their potency. In addition, preliminary *in vitro* toxicity studies can be performed in multiwell plate formats and the compounds' chemical structures can be assessed to see if there are common chemical moieties (pharmacophores) that allow grouping the hits into specific collections. The next stage in the current drug development process consists of different types of animal-based testing of those compounds that show the greatest promise in the prior cell-based assays. The proposed technology will be integrated in the process flow after cell-based assays and prior to animal testing.

Proposed work In the present proposal a microanalytical platform to monitor oxygenation, acidity and drug penetration in 3D tumor-like multicellular constructs will be realized by depositing microscopic sensor arrays onto a substrate such as a silicon or quartz wafer. Simultaneous interrogation of an array will thus provide direct information about the concentration of drug molecules at different depths in the tumor model, indicating drug penetration as it occurs in time. Oxygenation status and acidity can be monitored with similar arrays of the respective microsensors in the same time. A device reporting depth-resolved concentrations in tumor models can be fabricated with existing microfabrication and MEMS technology.

Synergistic activities In the proposed work the Laboratory for Biomedical Sensing of CWRU will design the sensor arrays based on unique IP, know-how and experience. Orbital Research will design the fabrication protocols of the sensor arrays. MicroFabrication Solutions will build the devices. Invenio Therapeutics will test drug molecules that have known *in vivo* efficacy with the developed devices and establish correlation between the test results and the known anti-tumor efficacy of the tested molecules. Lorain Community College will provide education to expand the pool of individuals qualified to work on the production of the drug testers. After this grant is accomplished product development can take place. All the proposed activities will be performed in North-Eastern Ohio.

Letter of Intent to the Ohio Third Frontier Sensor Program

Lead Applicant's name: NoBull Innovation (NBI)

Address: 444 E Second Street, Dayton, OH 45402

Phone number: 513-314-8297

Contact person: Dr. Wolfgang Spendel, spendewu@muohio.edu

Project title: Improving Sensor Specificity by Incorporation of Variable Geometry Separation Systems

Estimated Grant Funds to be requested: \$500,000

Known Collaborators: IDCAST/UDRI, Schlumberger

Summary

Our technology is focused on addressing the selectivity problems inherent in chemical, biological, radiological, nuclear, and explosive (CBRNE) sensors. There are two approaches to address selectivity: 1) create a molecular recognition element made from a material that will capture the analyte or 2) perform a separation process that isolates the analyte. Because the latter is a faster approach to the development of a sensor system, this team has focused on improving column technology. *We have made a major advancement in column technology that allows significant decreases in column size and temperature programming window, along with an order of magnitude decrease in separation time.* This advancement is ideal for the application of μ GCs to CNRNE sensing. We propose to commercialize our new variable geometry columns (VGC) technology, which uses a separation strategy based on differential acceleration rather than the near-constant velocity differential migration that occurs in traditional open tubular and packed GC columns.

Current commercial attempts at field-portable micro gas chromatographs (μ GCs) have shown that a MEMS gas chromatographic system interfaced to a detector/sensor can serve effectively as a highly specific sensor system with the ability to monitor tens or hundreds of target compounds simultaneously. Furthermore, μ GC systems are ideal for targeted analysis of a small subset of compounds within extremely complex sample matrices. These advantages make μ GCs an ideal approach for a variety of sensing applications, from environmental monitoring and quality control to homeland security and first response threat assessment. *However, existing prototype μ GC systems have performed well below expectations: they are too large and consume too much power to be competitive with traditional sensors for most applications.*

Based on our collective experience, it has been realized that the primary limitation in developing truly portable μ GCs is the separation column. Real-world samples require temperature programming of the separation column in order to achieve time-efficient separation with sufficient signal-to-noise ratios. The heating power and thermal isolation system required for temperature programming are the primary sources of power and space usage for μ GCs. These facts suggest that this limitation in GC columns is the single "stumbling block" that is preventing the successful application of μ GC sensor systems. To address this limitation, Dr. Steinecker invented the concept for the VGC technology (patented by Schlumberger).

Given Schlumberger's interest in pursuing this sensor technology for hydrocarbon analysis in remote oilfield scenarios, Miami University hired Dr. Steinecker (an Ohio native) to join the IDCAST CBRNE team using the Ohio Research Scholars program. One assignment was investigating how VGCs could be manufactured. Our results suggest that VGC is a viable technology with commercial applications beyond Schlumberger's needs. **NBI thrust 1** uses VGCs to improve the functionality of oilfield GC-based sensor systems. **NBI thrust 2** extends the VGC technology to the lucrative GC industry. The speed exhibited by the VGC system dramatically improves productivity (sample throughput) of QC/QA or service laboratories in the pharmaceutical and environmental laboratories, hydrocarbon refining, and food industries. **NBI thrust 3** implements MEMS VGCs to produce a low-power, low-size μ GC that can function as a sensor in process control application. NoBull Innovation owns the VGC manufacturing IP and will manufacture the columns in SW Ohio. We project that in the first three years of operation that total sales of \$12 million will be made which will create 12-15 Ohio jobs.

OTFSP 10-705

Riehl Engineering Ltd
2000 Composite Drive
Kettering, OH 45420
PH: 937.296.5090
Fax: 937.297.9437
www.riehleengineering.com

Ohio Department of Economic Development
Ohio Third Frontier
FY 10 Sensors Program

To Whom It May Concern,

This letter is to announce the intent of Riehl Engineering, with our collaborators, to submit a proposal for the development and commercialization of an advanced nutrient sensor. Riehl Engineering, with the assistance of YSI Inc., SCNTE LTD, the University of Cincinnati, and Green Valley Ventures will be seeking approximately \$500,000 in matching funds through OTF Sensors Program for the proposal entitled "Advanced Modified Carbon Nanotube Based Nutrient Sensor".

Thank you,

Bill L Riehl, PhD, PE
Managing Partner
Riehl Engineering

Ohio Third Frontier Sensors Program

2010 Request for Proposals

Application Information Page

Letter of Intent (LOI) Notification Number (Issued by ODOD)	LOI #: OTFSP 10- _____
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This Application:	<input type="checkbox"/> Does	<input checked="" type="checkbox"/> Does Not	include information considered a "trade secret" under Ohio Revised Code Section 1333.61 (D)
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Lead Applicant Name	DSHELL NETWORK ARCHITECTS.LLC		
Lead Applicant Address	20725 Germantown Dr		
City:	Fairview Park	Ohio County:	Cuyahoga
State:	Ohio	Zip Code:	44126

Project Title:	Crash Sensor		
State Funds:	OTFRDF\$ 1,000,000 .00	Wright\$	Cost Share: \$1,000,000 .00
	Total\$ 1,000,000.00		

Is the Lead Applicant the lead in any other proposal submitted under this RFP?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
If yes, provide the Other Project Title/LOI #:		

Typed Name of Authorizing Agent	Title of Authorizing Agent
---------------------------------	----------------------------

Signature	Date
-----------	------

For ODOD Use Only	
Date Received	Proposal ID #

Ohio Third Frontier Sensors Program

Lead Applicant Contact Information

Authorizing Agent	Name	Juanita Miller	
	Title	Chief Financial Office	
	Organization	DSHELL NETWORK ARCHITECTS.LLC	
	Address	20725 Germantown Dr	
	City, State, Zip	Fairview Park, Ohio 44126	
	Telephone	216 970 8260	Fax
	E-Mail	jmillerwireless@gmail.com	

Project Director	Name	Dan Shell	
	Title	Chief Executive Officer	
	Organization	DSHELL NETWORK ARCHITECTS.LLC	
	Address	20725 Germantown Dr	
	City, State, Zip	Fairview Park Ohio 44126	
	Telephone	216 970 8260	Fax
	E-Mail	dshellwireless@gmail.com	

Fiscal Agent	Name	Juanita Miller	
	Title	Chief Financial Office	
	Organization	DSHELL NETWORK ARCHITECTS.LLC	
	Address	20725 Germantown Dr	
	City, State, Zip	Fairview Park, Ohio 44126	
	Telephone	216 970 8260	Fax
	E-Mail	jmillerwireless@gmail.com	

Grant Administrator	Name	Cindy Miller	
	Title	President	
	Organization	DSHELL NETWORK ARCHITECTS.LLC	
	Address	20725 Germantown Dr	
	City, State, Zip	Fairview Park Ohio 44126	
	Telephone	216 970 8260	Fax
	E-Mail	cmillerwireless@gmail.com	

Authorizing Agent – the individual authorized by the Lead Applicant to accept the terms and conditions of an award of Grant Funds.

Project Director – the individual authorized by the Lead Applicant to direct the Project for which the Grant Funds have been awarded.

Fiscal Agent – the individual authorized by the Lead Applicant to sign Grant-related financial documents, e.g., Requests for Payment, Grant financial reports, etc.

Grant Administrator – the individual authorized by the Lead Applicant to oversee the day-to-day administration of the Grant Funds, including preparing progress reports, monitoring project progress, etc.

Note: The same individual may hold more than one of these positions.

Ohio Third Frontier Sensors Program Collaborator Information

Attach additional forms as needed.

Name	Rober Beckstrom	
Title	Dean of Arts and Sciences	
Organization	Lorain Community College	
Address		
City, State, Zip	1005 Abbe Rd Elyria, OH 44035-1691	
Telephone	800 995 5222 Ext 7108	Fax
E-Mail	rbecks@lorainccc.edu	

Crash Sensor

The Crash Sensor is a small device that attaches to the ODB2 interface of a vehicle. When the Crash Sensor senses deceleration, braking, and other indicators it will record the airbag deployment, number of passengers, deceleration rate and needed information to send over the Crash Injury Research Engineering Network (CIREN). By sending this information to the trauma surgeon in near real time they can begin effective treatment immediately when the crash subject arrives. This enhances the positive outcomes during the “golden hour”. If communication is not possible our unit will store the data until it can be retrieved.

We will be using open source embedded operating system as well commercial off the shelf technologies (COTS). The 1st generation of the crash sensor will be an external attachment to the ODB2 data bus on the vehicle. Later phases will achieve greater integration.

These devices will be rugged but aimed at the consumer market with an appropriate price point.

Our project will achieve better outcomes for crash subjects.

Dan Shell
DSHELL NETWORK ARCHITECTS.LLC
216 970 8260

GOODYEAR INNOVATION CENTER AKRON

P O BOX 3531
AKRON, OHIO 44309-3531

October 30, 2009

Letter of Intent to submit a proposal to the Third Frontier Sensors Program

The Goodyear Tire & Rubber Company in collaboration with the University of Cincinnati, NSF Center for Intelligent Maintenance Systems, Tech International (Johnstown, Ohio), and a trucking fleet TBD intends to submit a proposal to the Third Frontier Sensors Program for a "Commercial Truck Fleet Intelligent Tire Maintenance System."

The **Lead Applicant** on this proposal will be The Goodyear Tire & Rubber Company located at 1144 East Market Street, P.O. Box 3531, Akron, OH 44309.

The **Contact Person** for this project is Chris Varley, Global Program Manager, External Science & Technology Programs for The Goodyear Tire & Rubber Company. Mr. Varley's email address is chris_varley@goodyear.com. He can also be reached by phone via 330-796-8697.

The proposed **Project Title** is "Commercial Truck Fleet Intelligent Tire Maintenance System."

The estimated total **Grant Funds** requested will be \$500,000 over a two-year period.

Current **Known Collaborators** include The University of Cincinnati, NSF Center for Intelligent Maintenance systems, Tech International (Johnstown, OH), and a truck fleet operator to be named at a later date.

A One Page Summary of the Proposed Project is provided on the following page.

Sincerely,



Surendra K. Chawla, Ph.D.
Senior Director
External Science & Technology Programs
The Goodyear Tire & Rubber Company
Innovation Center – P.O. Box 3531, Dept. 480A-5SW
Akron, OH 44309
schawla@goodyear.com
Phone: 330-796-1994
Fax: 330-796-9601

GOODYEAR INNOVATION CENTER  **AKRON**

P O BOX 3531
AKRON, OHIO 44309-3531

Project Description: Commercial Truck Fleet Intelligent Tire Maintenance System

Fuel and tires are the top two truck fleet operational costs. Both of these costs could be reduced by an intelligent fleet tire maintenance system. This system, enabled by the fusion of sensor data from tire RFID, tire cavity air pressure and temperature monitoring and tire tread wear monitoring, would proactively anticipate and meet maintenance needs to reduce costs and prevent breakdowns.

Goodyear intends to produce a maintenance system product including hardware, software and related service business, to predict the remaining useful life of tires and provide services to the fleets. Advanced prognostics and intelligent maintenance systems expertise of the University of Cincinnati National Science Foundation Industry/University Collaborative Research Center for Intelligent Maintenance Systems (IMS) will be used with data from real world trials with a truck fleet to develop the smart maintenance algorithms. Tire RFID products produced by Tech International will be used to positively identify and track tires and their service history in the system. Both domiciled and long haul truck service cases will be included.

We plan to spend the first year of the proposal in collecting data and developing the system and the second year in a commercial trial to validate and demonstrate the value of the system.

The resulting commercial product will have unique capabilities due to its intelligent algorithms. It will expand the Goodyear's business into new proactive service product offerings and provide an expanded market for Tech International's RFID products.

OTFSP 10-708

Cornerstone Research Group
ODOD Third Frontier RCP Letter of Intent
November 2, 2009

Cornerstone Research Group Inc. (CRG) is a for-profit technology incubator located in Dayton, Ohio, focusing on applied research and development activities with direct application to the commercial and military marketplace. By leveraging capabilities across multiple industries and disciplines, CRG rapidly transitions innovation into products and is committed to keeping production in Ohio and supporting the growth of Ohio's jobs and industries.

CRG is a long-time supporter of the Third Frontier Program. CRG's past Third Frontier projects have surpassed the original objectives for both job creation and sales. Through CRG's Ohio Third Frontier Commercialization Grant, CRG created 20 full-time jobs with an average annual salary of \$45,000 (original job creation objective: 10 full-time positions), and at two years into the program, total related sales have already exceeded the overall project objective by 12.3%. CRG is also a participant in the Ohio Third Frontier Internship Program. CRG has been a strong advocate of college internship opportunities since its incorporation: 47.5% of CRG's current full-time engineering and scientific staff started their technical careers at CRG through internship positions. CRG has hired 81 college interns under the Ohio Third Frontier Internship Program; 13 of those interns have been hired into full-time positions at CRG.

CRG is pleased to submit this Letter of Intent in response to the Research Commercialization Program (RCP) being sponsored by the State of Ohio Third Frontier Program.

Lead Applicant:

Cornerstone Research Group, Inc.
2750 Indian Ripple Road
Dayton, OH 45440

Christopher Hemmelgarn
Business Area Manager, Aerosystems
P: 937-320-1877 ext. 1137
F: 937-320-1886
hemmelgarncd@crgrp.com

Project Title:

Airborne Sensor Systems for Real-Time Environmental Mapping, Intelligence, Surveillance, and Reconnaissance (ISR)

Estimated Grant Funds:

\$1 Million from the Third Frontier Research and Development Fund
\$2 Million from the Wright Capital Fund

Known Collaborators:

UDRI Institute for Development Commercialization of Advanced Sensor Technology (IDCAST) (Dayton, OH); i23D, LLC (Dayton, OH); Tidex Systems (Tel Aviv, Israel); Think-a-Move (Beachwood, OH); Co-operative Engineering Services, Inc. (Xenia, OH)

**AIRBORNE SENSORS FOR REAL-TIME ENVIRONMENTAL MAPPING,
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR)**
PROJECT SUMMARY

Cornerstone Research Group Inc. (CRG) is a for-profit technology incubator focusing on applied research and development activities with direct application to the commercial and military marketplace. Leveraging the established technologies and capabilities among partner organizations, CRG proposes to integrate a suite of technologies to realize a systems-level capability that does not exist today. This system combines the three-dimensional mapping performance of the i23D software with the flight capabilities of the HALO™ micro air vehicle from CRG to create a system capable of transforming a two-dimensional video stream into a three-dimensional virtual world in real time by simply flying through the environment. The HALO™ system's ability to fly in complex environments, due its inherent design features, offers the user an opportunity to not only create detailed virtual worlds of the outside environment, but also inside of buildings or caves to improve mission planning effectiveness and operational safety.

Further enhancement of this system is accomplished through the introduction of speech recognition system, SPEAR™, from Think-a-Move, which will permit the operator to use voice commands to operate the HALO system. Such a capability has never been demonstrated in an unmanned air system, but is currently being demonstrated by Think-a-Move on multiple unmanned ground vehicles. As a result of this capability, the system becomes very easy to operate, allowing the user to “fly the sensor” and not the air vehicle.

Funds from the Ohio Third Frontier Sensors Program will be used to accomplish the following:

1. Perform final integration of the system components, providing a revolutionary capability to the Department of Defense and Commercial markets.
2. Perform flight demonstrations and generate marketing quality videos for potential customers and private investors.
3. Establish the product package and manufacturing plans for raising private equity and the start-up of a new business, Sentinel Aerosystems.
4. Perform focused business development activities addressing the needs of the Army, Air Force, Navy, Marines, SOCOM, Homeland Security, Search and Rescue, Law Enforcement, and Private Security.

CRG estimates that funds from the Ohio Third Frontier Program, in support of this project will generate more than 30 high-tech jobs within the first three years and more than 200 high-tech and manufacturing jobs within five years from the start of the project.



Frank J. Beafore, Executive Director
SelectTech GeoSpatial
1251 Blee Rd.
Springfield, OH 45502
937-470-3908
fbeafore@SGAMF.com

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215
OTFSP2010@development.ohio.gov

November 1, 2009

Subject: 2010 OTFSP LOI

Dear Sir/Madam:

SelectTech GeoSpatial Corporation is very pleased to submit this letter of intent (LOI) to submit a full proposal in response to the subject RFP – Ohio Third Frontier Sensors Program (OTFSP) on or before November 4, 2009 for FY2010.

Project Title:

The Commercial Development of Short Wave Infrared (SWIR) Tactical Camera and Laser Illuminator for Military, First Responder and Industrial Applications

Topical Summary:

Recently, Short Wave Infrared (SWIR) sensors have been produced in repeatable quantities sufficient to become the basis for a novel, highly portable, hand held device that can enhance low observable images to full recognition. Coupled with an Infrared (IR) solid state laser illuminator, this device can greatly enhance the work of specialized military personnel, first responders, Industrial R and D and process engineers and scientists.

SelectTech GeoSpatial, a newly formed, advanced manufacturing facility located in Springfield, Ohio endeavors to design, prototype and build a handheld IR laser-enhanced SWIR Camera. This portable camera will be capable of seeing through fog, smoke rain and other light-blocking environments. It will be also capable of seeing in all light conditions – from bright light to pitch dark. This instrument will also be able to detect other variable surface conditions outside the human eye range.

The type of product, once developed, has the potential to become an on-going source of revenue for the agencies and organizations involved. Using this product as a basis a whole suite of high tech products and services could be developed including; image processing, forensic analysis, GIS products and services, advanced hardware solutions, and sophisticated software exploitation.

Estimated Request

\$950,000 (TFR&DF) and \$200,000 (WCF)

Lead Applicant:

SelectTech GeoSpatial – Frank J. Beafore (see above)

Potential Collaborators:

Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST)
Nova Sensors (NOVA)
Wright State Research Institute (WSRI)
Wright State University (WSU)
Air Force Research Laboratories (AFRL)



Sincerely,

Frank J. Beafore
Executive Director

**NEW ANTENNA SYSTEMS LLC
1160 CORRUGATED WAY
COLUMBUS, OH 43201**

November 2, 2009

*Ohio Department Of Development
Technology Division
Third Frontier Sensors Program
77 South High Street, 25th Floor
Columbus, Ohio 43215*

RE: OTFSP2010 LOI

Dear ODOT Technology Division Administrator:

I am writing as lead applicant to provide this Letter of Intent in response to the RFP for the Third Frontier Sensors Program 2010.

The tentative title of our proposal is:
Large Scale Manufacturing and Implementation of the Next Generation of Uniquely Efficient, Effective and Proprietary RFID, Sensor Reader Systems and Antennas.

(Summary on page 2 and 3, following)

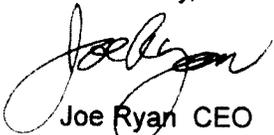
Our current collaborators are:

Wistron NeWeb Corporation Taiwan ROC
Widmer Associates Gibsonberg, Ohio
The Dept. of Electrical & Computer Engineering, The Ohio State Univ., Columbus, OH
AG Connections Murray, KY
Entrigal High Point, North Carolina

The estimated budget for all costs, including indirect costs of 20% is \$1,000,000

If you require any additional information, please contact me at your convenience. Thank you very much for this opportunity to respond to this critical RFP.

Yours truly,



Joe Ryan CEO
New Antenna Systems
970-214-6810
EMAIL: jmr@newantennasystems.com

New Antenna Systems LLC LOI Summary of OTFSP Project

New Antenna Systems, LLC (NAS) is an Ohio Limited Liability Corporation who designs, develops, markets, and installs complex micro processor based sensor systems. These systems are patent protected and incorporate Radio Frequency Identification (RFID), Optical, GPS and a variety of other sensors that provide solutions for highly sought after, complex real-world applications for these promising and very versatile sensor technologies.

NAS solutions are uniquely based on the State of the Art technical expertise and patent-pending products coming from The Ohio State University's ElectroScience Laboratory (OSU/ESL). Because of the world-renowned reputation of its technical team and OSU/ESL, NAS has been able to attract Wistron NeWeb Corporation (WNC), one the world's lowest-cost and highest volume, electronics manufacturers, to be an investor/partner in this venture. As a result of this partnership, the combination of NAS's proprietary hardware designs and WNC's remarkable manufacturing capability are, for the first time, able to provide the highest performing and lowest-cost RFID solutions in the global marketplace. These solutions are proprietary to NAS/WNC.

The current major focus of NAS is related to solving the limitations of very complex item-level RFID solutions for Ohio farmers and retailers. Item-level solutions are required so that RFID can finally achieve the massive expansion always expected of this promising technology by The Federal Government, Wal-Mart and numerous other major industry participants. Well beyond mass retail, this technology has great application to many business sectors within the Ohio economy including but not limited to agribusiness, automotive, alternative energy, biomedical and electronic industries. All these industries wish to substantially improve their competitiveness by improving inventory control/tracking, security (theft reduction) and especially customer service. With NAS technology such businesses will now be able to achieve a very attractive return on their sensor technology investments (ROI).

NAS's objectives with this technology is to 1) improve the overall performance of sensors; 2) expand the applications and use of its sensors; and 3) enable the fusion of multiple sensor platforms to obtain a complete, highly accurate and affordable picture of an environment. By focusing on these three areas, NAS will position itself as a leader in RFID and other sensor technologies.

Presently, NAS is in the Demonstrating Phase with several Proof of Concepts completed inclusive of A, B and C Metrics. The first two phases, "Innovation" and "Incubation" have been totally funded by WNC. One demonstration and three successful trials have been completed. NAS trial partners have been very impressed with the results and are becoming increasingly active in and investing in the NAS Solution. As a result of this success, three major trials will be taking place in the coming months. These trials will:

- 1) Develop, test and refine a one-of-kind item-level RFID solution for The Limited and its 250 stores,
- 2) Create a totally unique RFID/GPS/wireless traceability solution for Ohio food producers
- 3) Deploy a novel RFID/optical sensor system that can be used to track, time and document all types of events across a wide variety of industry applications.

Each of these applications has been chosen because of its complexity and commercial value to the partner companies involved, to NAS and to Ohio. In each case, there are major demonstrations that are presently being used to verify that NAS's solutions work as predicted, are proven successes, highly versatile and provide a positive return-on-investment for its customers. All of these trial studies are underway and are progressing on or ahead of schedule. As a result we believe that our Proposed Solution precisely fits all the criteria of the OTF RFP and that we are progressing rapidly toward successful commercialization of our unique sensor technology solutions.



2 November 2009

Mr. Aaron Boesch
Persistent Surveillance Systems
140 North Valley Road
Xenia, OH 45385

Ohio Department of Development
Technology and Innovation Division
77 South High St., 25th floor
Columbus, OH 43215

This Letter of Intent (LOI) is in response to the Ohio Third Frontier Sensors Program FY2010 RFP. Persistent Surveillance Systems, in partnership with IDCAST and the University of Dayton, intend to submit a proposal in response to the Sensor Program RFP.

Persistent Surveillance Systems will be the lead applicant for the *Colorization and Resolution Enhancement of Airborne Wide-Area Persistent Surveillance Sensors for Law Enforcement Operations*. The total estimated grant funds to be requested for this effort are \$878k. The contact information for the lead applicant is given below:

Organization: Persistent Surveillance Systems
Address: 140 N Valley Rd, Xenia, OH 45385
Company Phone: 937-260-4281
POC: Aaron Boesch, Partner
POC Phone: 651-336-0539 (cell phone – POC is employed in Xenia, OH)
POC Email: aaron@persistentsurveillance.com
Website: www.persistentsurveillance.com

A one-page description of the effort is attached. Thank you for this opportunity.

Sincerely,

//signed//

Aaron Boesch
Partner, Persistent Surveillance Systems

Proposal Summary: Persistent Surveillance Systems (PSS) will build, test, and operationally evaluate a three-color Wide-Area Aerial Surveillance (WAAS) system in Xenia, OH. PSS will leverage existing sensor technologies to reduce program risk. More specifically, PSS will integrate existing WAAS software used in its monochrome WAAS system and in its three-color, Wide-Area Ground Surveillance (WAGS) system.

Like the existing operational WAAS sensor, the next-generation electro-optical system will consist of eight shutterless CCD sensors. However, this new sensor will migrate away from monochrome, 11 megapixel CCD technology into newer, higher-resolution 16-megapixel color CCD sensors. The next-gen WAAS sensor will have a total of 128 megapixels.

Persistent Surveillance Systems will be the prime contractor to build, integrate, flight test, and operationally demonstrate the 128 megapixel WAAS system. PSS will demonstrate the utility of its new sensor by flying it for 100 hours for an existing customer that utilizes PSS's 88 megapixel monochrome system. The end-goal of this demonstration is for the customer to realize the value of the color technology and to extend the existing contract with a color WAAS system.

PSS will collaborate with local technology partners IDCAST and the University of Dayton (UD) to assist in the overall effort. IDCAST has agreed to assist PSS with the marketing, demonstration, and analysis of the new imagery. The University of Dayton will partner with PSS in optimizing the imagery from the new sensors. More specifically, UD will use its Embedded Data Processing Laboratory (EDPL) to develop a seamless camera model for the three-color system. One of the major shortfalls of existing WAAS sensors (both military and commercial) is the "choppy" transition from sensor to sensor. The University of Dayton will make the sensor to sensor transition seamless – giving the user a single, uninterrupted image.

Overall Effort Summary:

1. Build 128 megapixel WAAS system by leveraging existing sensor technology (PSS)
2. Develop seamless camera model for new WAAS system (UD)
3. Flight test 128 megapixel sensor to verify operation (PSS)
4. Operationally demonstrate sensor (100 hours) for existing WAAS customers (PSS)
5. Analyze imagery for customer (PSS and IDCAST)
6. Market sensor to military and technology collaborators (IDCAST)

Background: Persistent Surveillance Systems provides very high-resolution aerial surveillance services to our law enforcement customers. In on-going WAAS operations over certain cities (that must remain confidential), PSS has recorded several murders, including the brutal execution of a police officer. With this imagery, PSS has back-tracked murder suspects to where they were before the murder and to where they went after the murders. PSS is able to do the same with the accomplices and witnesses. Persistent Surveillance Systems analyzes the imagery, and relays the information and evidence to their customer and the Drug Enforcement Agency (DEA). PSS will use this next-gen WAAS system to more effectively serve its existing customers with the goal of extending its existing surveillance contracts as well as securing new ones.

November 4, 2009

Ohio Department of Development
Technology and Innovation Division
Attention: OTFSP
77 South High Street, 25th Floor
Columbus, OH 43215



4454 Idea Center Blvd

Dayton, Ohio 45430-1500

937.461.5660

Fax: 937.461.0743

www.woolpert.com

**RE: Ohio Third Frontier Sensors Program
Fiscal Year 2010 Request for Proposals**

To Whom It May Concern:

Woolpert is pleased to provide you with this letter of intent to submit a proposal for the Ohio Third Frontier Sensors Program for Fiscal Year 2010. Woolpert, a remote sensing and engineering firm, is an industry leader in geospatial services and three-dimensional (3D) technologies.

As the lead applicant for this effort, Woolpert will work with two collaborators to promote technology-based economic development in Ohio by commercializing proprietary software that transforms 2D videos into real-time, 3D models. Details of our proposed project are as follows:

- Our collaborators are the University of Dayton and i23D, LLC, a privately-owned high technology firm.
- We are seeking \$1 million in Ohio Third Frontier funds.
- Our proposed project title is Commercialization of Software to Transform Two-Dimensional Videos to Three-Dimensional Models.

The potential applications for transforming 2D videos real-time 3D models are unlimited. A few of those applications are summarized below.

- For the military and defense industry, the software could be employed for battlefield targeting and machine vision required for navigation of unmanned aerial and ground vehicles.
- Homeland security and drug enforcement agents could use the technology for video alarms. Three-dimensional models generated from real-time video feeds could detect changes in movement that trigger system alerts.
- In the architectural, engineering and construction industries, the software could be used to more efficiently generate 3D Building Information Models (BIM) useful for conserving energy and maintaining structures throughout their life cycles.
- In the event of a terrorist attack or natural disaster, 3D models could help emergency responders locate victims more quickly while keeping police, firefighters and paramedics out of harm's way.

November 4, 2009

Page 2

- In the geospatial and aerial mapping industry, the technology could provide a cost-effective method to acquire 3D datasets by reducing the costs of data acquisition and post-processing.
- In the entertainment industry, this software could provide movie producers a way to dramatically lower costs by creating 3D models for animated films by computer instead of building 3D sets by hand.

These industries could generate billions of dollars in contract opportunities for Woolpert and its collaborators, creating a new industry in the State of Ohio.

The purpose of our Ohio Third Frontier proposal is to create jobs and generate revenue for Ohio by dramatically expanding the application of the proprietary visualization software. Woolpert and our collaborators propose to use Third Frontier funds to work with previously-identified end-users of the software to create custom applications. This will involve rewriting portions of the existing software and revising algorithms to provide these end-users with 3D modeling software that meets their specific technical, cost, and performance standards. The end-users who have previously expressed interest in this technology are both the Sensors and the Human Effectiveness Directorates of the Air Force Research Laboratory (AFRL), BAE Systems, the U.S. Border Patrol, and AeroVironment, Inc.

Additionally, we will use Ohio Third Frontier funds to identify other potential markets and interested end-users who can provide resources for the next level of commercialization. Woolpert and our collaborators will endeavor to identify the most interested end-users who can provide the best return on investment and provide the greatest resources for commercialization.

Woolpert is already using Ohio Third Frontier funds to explore commercialization of 3D models generated from LiDAR point cloud data. In support of the IDCAST MOST initiative, Woolpert is building the hardware and software environment and algorithms necessary to automate the process of creating accurate 3D urban models in a dramatically more efficient manner.

Again, we appreciate the opportunity to submit this letter of intent for the Ohio Third Frontier Sensors Program Fiscal Year 2010 Request for Proposals. Our lead applicant contact information for this effort is as follows:

Woolpert, Inc.
4454 Idea Center Boulevard,
Dayton, Ohio 45430-1500.
Phone: 937.461.5660

November 4, 2009
Page 3

Contact Person: Stephen Phipps
steve.phipps@woolpert.com

We look forward to submitting our proposal for the commercialization of software to transform 2D videos to 3D models.

Sincerely,

Woolpert, Inc.

A handwritten signature in black ink that reads "Stephen P. Phipps". The signature is written in a cursive style with a large, stylized 'S' and 'P'.

Stephen P. Phipps
Senior Vice President

Ohio Third Frontier Sensors Program- RFP

Letter of Intent

Lead Applicant-

InSeT Systems LLC
526 S. Main Street, Suite 710-B
Akron, OH 44311
330-434-0202

Contact Person-

J. Jay Breeding
COO- InSeT Systems LLC
jay.breeding@insetsystems.com

Project Title-

Development of Second Generation Underground Mine Inertial Sensor Tracking and Communication System.

Estimated Grant Funds-

\$800,000

Known Collaborators-

Not yet identified

Project Summary-

The InSeT Systems Inertial Tracking and Communications system has been developed and will reach the underground mining market early in 2010. This system utilizes an inertial sensor, a MEMS unit, combined with proprietary software to accurately track underground personnel and equipment. The InSeT System has an error no greater than 10 feet after 24 hours of operation. It is vastly superior to competing RFID systems, which have an error rate based on the spacing of the tag readers, usually 1,000-2,000 feet. And the RFID systems are not real time. They only send location data when a tag has passed a reader.

The initial version of the Inertial Tracking and Communication system incorporates precision tracking and two-way voice and text communication. This information is then transmitted out of the underground area to a base station by way of a wireless mesh network. This network is protected from shock waves, which may be generated by underground accidents, by explosion proof blast shields to protect the relay transmitters.

InSeT Systems in collaboration with one of the software developers for the initial system plans to use the OTFSP grant to:

Develop a second-generation system, which will include an enhanced tracker unit with sensors to measure methane, carbon monoxide, and oxygen in the atmosphere. It will also include a vital signs monitor, which will determine the presence of a pulse. This will allow a rescue team to determine which trapped personnel need to be "rescued" as opposed to those that need to be "recovered". The advantage of a system, which provides vital sign status in a rescue situation, is invaluable and obvious.

Develop equipment trackers that do not include the communications capability. Mine operators expect the tracking and communications systems to pay for themselves with operational improvements generated by knowing the location of key pieces of equipment and supplies at all times. The development of an equipment tracker without the communications link will be a cost reduction for a complete system.

The project is estimated to require approximately \$1,600K, to be spent as follows:

Evaluate available sensors for the required capabilities.	\$300K
Redesign the tracker unit to accommodate the additional sensors	\$200K
Acquire new plastic tooling for the redesigned tracker unit	\$350K
Write new software to support the new sensors	\$450K
Submit for MSHA testing	\$100K
Market the new system	\$200K
Total	\$1,600K

With the required 50% match, this request is for a grant of \$800,000.

InSeT Systems is in discussions with LogiSync, the Avon, Ohio based company, which developed much of the first generation system software, to have them collaborate on the second generation.

OTFSP 10-714

Ohio Third Frontier Sensors Program Letter of Intent for 2010 RFP

Lead Applicant: The Ohio State University Office of Sponsored Programs, 1960 Kenny Road, Columbus, OH 43210

Proposal Title: Low-Cost High Accuracy GNSS/IMU Sensor for Car Safety and Accident Prevention

Budget Request (Estimated): \$1,000,000 (Capital: \$50,000; Operating: \$950,000)

OSU Departments:

OSU Department of Mechanical Engineering

OSU Department of Civil & Environmental Engineering & Geodetic Science (CEEGS)

OSU Department of Electrical Engineering

Industry Partners: DGNSS Solutions, SEA, Ltd., TRC, Inc.

Contact: Dennis A. Guenther, Department of Mechanical Engineering, 201 West 19th Avenue, Suite N353, Columbus, OH 43212, e-mail: guenther.1@osu.edu, tel. (614) 292-5339, fax. (614) 292-3163

- One-page summary attached

Low-Cost High Accuracy GNSS/IMU Sensor for Car Safety and Accident Prevention

The modernization of the GPS Constellation with new satellites, transmitting new and stronger signals, designed for multipath resistance and easier signal tracking will revolutionize the GPS positioning in the next 3-5 years. Russia, Europe and China are racing with the US to develop their own Global Satellite Navigation Systems (GNSS). GLONASS (Russia), Galileo (Europe), and Compass (China) will be fully operational in the next 3-7 years. The availability of all these Satellite Systems will allow the GNSS receivers of the future to deliver GNSS cm-level navigation even in urban canyons.

The rapid advances in the MEMS Inertial Measurement Unit (IMU), and image positioning technologies have the potential to provide sub-meter accuracy for the few minutes when GPS positions are not available, especially in urban canyons. These advancements will have major implications in transportation automation, and safety applications. The development of a low-cost sub-meter GPS/IMU positioning sensor able to integrate the measurements from any available car sensors (i.e., infrared/visual video image, radar, laser, and angle sensors) will provide the capability to monitor in real-time the car dynamics and the car environment. Adding to the GNSS/IMU sensor the ability to interface directly with the controls of the car and to communicate with the other vehicles (V2V – Vehicle-To-Vehicle) and the Infrastructure (V2I – Vehicle-To-Infrastructure) will provide the enabling technology for the next generation of the In-Vehicle Navigation Systems. This technology has the potential to revolutionize car safety and accident prevention applications. The proposed modular sensor will have the capability to issue warnings to the car driver for potential accidents, provide signals for on-vehicle control systems to prevent inevitable fatal accidents, warn the other vehicle drivers of inevitable and/or occurred accidents, and prevent multi-car collisions. This technology will also allow to monitor vehicle-trajectories/vehicle dynamics in real-time, estimate trailing vehicle trajectories in real-time, monitor deviations of vehicle trajectories from the expected trajectories (i.e., movement around potholes, debris, disabled vehicles, etc.), detect sudden stops, detect vehicle sliding, detect vehicle trajectories within signalized/un-signalized intersection environments, predict, and prevent potential side-crashes in real-time.

This proposal will focus on the development of a low-cost high-accuracy modular GNSS/IMU sensor configurable to 1) Interface with the controls of the car; 2) Communicate with the other vehicles (V2V) and the Infrastructure (V2I); and 3) Accept infrared/visual images, radar range measurements, laser, and angle measurements. This sensor will be developed as an add-on module to be integrated in new cars, and be retrofitted in old ones. The market opportunity for this integrated sensor is huge both in the US and internationally because the proposed sensor has the potential to save thousand of lives and it is designed to be low-cost, modular, and able to be integrated in new and old cars. In the US alone there are 41,000 car accident related deaths with 30% of them involving people younger than 25 years old (FHWA Strategic Plan, October 2008).

The Ohio State University has a long history and an excellent research record in GNSS/IMU/Imaging technology development since the initial stages of the GPS system deployment in the early eighties. OSU also has a strong component in car automation and safety within the Center of Automotive Research. This combination provides the perfect environment to build and commercialize the enabling technologies for the next generation of the in-Vehicle Navigation systems.

LETTER OF INTENT

November 2, 2009

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

To Whom It May Concern:

STAN Solutions, LLC, a Dayton, Ohio-based company, wishes to notify The Ohio Department of Development (Technology and Innovation Division) of our intention to submit a proposal in response to the Ohio Third Frontier Sensors Program RFP released on October 7, 2009. Please find our contact information, proposed project title, estimated funding request, known collaborators and project summary illustrated in the following paragraphs and pages.

Lead Applicant

- Company Name: STAN Solutions, LLC
- Address: 714 E. Monument Ave., Suite 117, Dayton, OH 45402
- Telephone: 937-531-6637
- Contact Person: Aaron Manuel, Program Manager
- Contact Telephone: 937-206-3764
- Contact Email: aaron.manuel@stan-solutions.com

Proposed Project Title

- Wireless Persistent Surveillance Ground-Based Camera

Estimated Grant Funds to be Requested

- \$1 Million

Known Collaborators

- University of Dayton Research Institute
- IDCAST
- Adaptive Imaging Technologies, Ltd.
- Innova, Inc.

Summary of Proposed Project

The project will develop a security and surveillance camera that has two unique characteristics:

1. A single camera can provide a panoramic video image, along with any number of ultra-high resolution zooms within that panorama, all simultaneously.
2. The camera can operate day and night, without the problems associated with current night-vision solutions.

From the user's standpoint, the core benefit is that *a single device provides the same functionality as a large number of conventional cameras and illumination systems*. In other words, systems that require numerous high-end cameras and illuminators today, will be able to use a single Adaptive camera instead.

The product can be thought of as a "*panoramic telescope*". It enables a single unit to provide panoramic coverage of a wide area, along with live telescopic zooms on any number of independent targets within that area, all simultaneously.

This unique capability is enabled by two breakthroughs:

- *GigaPixel resolution* (i.e., the camera enables 1,000 times higher native resolution than conventional video cameras)
- *Dynamic foveation* (i.e., full resolution is retained only on areas of interest - resolution elsewhere is automatically reduced so that total number of pixels per image remains at reasonable levels).

This combination enables unheard of levels of resolution on areas of the image that are important, without "breaking the bank" in terms of bandwidth and processing requirements.

In addition, the system will include a unique "*just in time*" *laser illumination system with ranging capability* (i.e., areas of the scene are illuminated precisely as they are being acquired by the camera).

It should be noted that:

1. Distribution of zooms is *totally dynamic and can be changed in real time between each frame*.
2. All pixels are "true" pixels – no compression, interpolation, or other software manipulation is involved
3. There is no mechanical focusing – all zooms are purely digital
4. The technology is effective both day and night (especially when coupled with "just in time" Laser illumination system with ranging capability).
5. The technology is robust and relatively low cost

It should also be noted that while the above capabilities may sound implausible to people in the field, feasibility has been proven and a lab prototype can be demonstrated.

This product will primarily be marketed for urban monitoring and critical infrastructure and transportation security.

Our team would like to thank The Ohio Department of Development for administering this RFP on behalf of the state of Ohio. We are looking forward to submitting the full proposal to you by December 7th.

Best Regards,

Aaron Manuel

Aaron Manuel
Program Manager
STAN Solutions, LLC



OTFSP 10-716

November 3, 2009

Ohio Department of Development
Technology Division
77 South High Street, 25th Floor
Columbus, Ohio 43215

Dear Ohio Department of Development:

Please accept this Letter of Intent from Frontier Technology, Inc. (FTI) for our Fiscal Year 2010 Ohio Third Frontier Sensors Program (“OTFSP”) proposal.

Lead Applicant Name:	Frontier Technology, Inc.
Address:	4141 Colonel Glenn Highway Suite 140 Beavercreek, OH 45431
Telephone:	937-429-3302
Contact Person:	Mr. Ronald D. Shroder, CEO & President
Contact Email:	rshroder@fti-net.com
Project Title:	Dynamic Adaptive Multi-Sensor Data Fusion and Analysis System
Estimated Grant Amount Requested:	\$1,000,000
Known Collaborators:	The Ohio State University and GE Aviation

Summary of Proposed Project:

System integrators, operators, and original equipment manufacturers in a number of industries including automotive, aerospace and advanced energy are looking for ways to increase system availability, improve system reliability, and reduce the cost of system operations. Unplanned outages - those which occur when systems degrade or fail unexpectedly - reduce system use since these outages require a service interruption to repair or replace the damage and contribute to revenue losses.

Contemporary maintenance strategies are focusing on migration to Performance Based Logistics (“PBL”) and Condition Based Maintenance (“CBM”). These strategies shift away from time-based scheduled maintenance to a predictive approach. The desired goals of these efforts are to reduce logistics footprints, logistics response time, life-cycle cost, and to increase availability. The technology that Frontier Technology, Inc. (FTI) will propose, supports these new maintenance/logistics concepts, while also effectively supporting the three major technical objectives of the Ohio Third Frontier Sensors Program, which are to: 1) improve the performance of sensors; 2) expand the application and use of sensors; and 3) enable the fusion of multiple sensor platforms to obtain a complete picture of an environment.

*4141 Colonel Glenn Highway, Suite 140, Beavercreek OH 45431-1662
Telephone: (937) 429-3302 FAX: (937) 429-3704*



FTI will propose to build on its foundation of data visualization, pattern recognition, multi-sensor analysis, and prognostics technologies to develop and to offer to Ohio-based sensor manufacturers and users, a Dynamic Adaptive Multi-Sensor Data Fusion and Analysis System (“DAMDAS”). The use of advanced sensors with data fusion and analysis technology provides the ability for both manufacturers and operators to improve the reliability of the products and systems while reducing overall cost of manufacturing and ownership. DAMDAS supports all three of the OTFSP objectives by providing the means for effectively translating the large variety and volume of data provided by advanced sensors into actionable information.

DAMDAS builds on two technologies that are part of FTI’s NormNet® family of Sensor Data Products and Solutions: (1) NormNet® EDS and (2) NormNet® PHM. NormNet® EDS provides the tools to detect patterns and identify problems and unexpected conditions in a complex environment based on the fusion and analysis of data from a wide variety of sensors and sources. It uses state-of-the-art multi-sensor pattern recognition paradigms that combine sensor data and contextual information to form an accurate picture of an environment or system. NormNet® EDS integrates sensor data, images, and text with similar data from other sources into a “single picture” providing information that is critical to understanding the status of the system and selecting the correct action or response.

NormNet® PHM facilitates the use of new maintenance strategies that represent efforts to shift time-based scheduled maintenance to preventative and predictive approaches based on evidence of need that will reduce total cost of ownership while enhancing system operations. NormNet® PHM provides the ability to integrate multiple sensors and data sources to provide the ability to monitor continuously system performance, provide early detection of abnormal conditions and precursors of future failures, identify failing components, and recommend remedial action in time to avoid negative service impact or catastrophic failure.

The objective of FTI’s proposed research is to integrate these two technologies into a market ready, multi-sensor fusion and analysis system for the automotive and aerospace industries. Teamed with Ohio-based collaborators in automotive and aerospace, FTI will positively impact the development of Ohio’s sensors industry by improving the results of sensor performance and functionality while enabling the fusion of multiple sensor platforms to obtain a complete picture of a system’s operating environment.

Based on past experience, we believe the basis of technologies to be proposed by FTI has been proven it can be used effectively in several system-related areas of interest to the state of Ohio. We are confident that the technology can be very beneficial to the automotive and aerospace industry within the state and when refined and matured can lead to new commercial opportunities for companies operating within Ohio.

Sincerely,

Mr. Ronald D. Shroder
President/ CEO
FTI

Hansen, Andrew

From: SOUTHARDS, WILLIAM [wsouthar@kent.edu]
Sent: Tuesday, November 03, 2009 4:40 PM
To: OTFSP2010
Cc: kirkt@marlinmfg.com; 'Mark J. Heiferling'; FITZSIMMONS, VERNA; srpansin@cc.yzu.edu
Subject: 2010 OTFSP LOI

Fiscal Year 2010 Ohio Third Frontier Sensors Program Letter of Intent

Lead Applicant: Kent State University College of Technology

Contact Information:

W. T. (Tom) Southards, Outreach Program Manager
KSU - College of Technology
PO Box 5190 (Van Deusen Hall)
Kent, OH, 44242-0001

Phone: 330-672-0793 (office direct line) or 330-283-7880 (mobile - personal)
email: wsouthar@kent.edu

Proposed Project Title: Virtual Ad-Hoc Wireless Sensor Network for Industrial and Commercial Thermocouples and Other Devices

Estimated Grant Funds to be Requested:

Third Frontier Research and Development Funds: \$750,000
Wright Capital Funds: \$150,000

Known Collaborators:

1) Bluetronix Inc.
8401 Chagrin Rd, Suite 5A
Chagrin Falls, OH 44023

Contact: Mark J. Heiferling, President
Email: mheiferling@bluetronix.net
Mailing Address: Bluetronix Inc.
PO Box 23054
Chagrin Falls, OH 44023

Phone: (440) 247-3434

2) Marlin Manufacturing Corporation

11/12/2009

12800 Corporate Dr
Cleveland, OH 44130-9311

Contact: Kirk Teutschbein
Phone: (216) 676-1340, Email: kirkt@marlinmfg.com

3) Salvatore R. Pansino, Ph.D
Department of Electrical and Computer Engineering
Youngstown State University
One University Plaza
Engineering Science Bldg, Rm 2035
Youngstown, OH 44555-3012
Phone: (330)941-3011, e-mail: srpansin@cc.ysu.edu

Virtual Ad-Hoc Wireless Sensor Network for Industrial and Commercial Thermocouples and Other Devices

Bluetronix Inc. developed their proprietary SARA algorithm to implement SWARM technology in ad hoc networking under a combination of NASA SBIR Phase I funds, DARPA SBIR Phase II Funds and two SBIR Phase II enhancement contracts (the first funded by a combination of DARPA and US Army funds and the second by DARPA funds). The total R&D investment to date exceeds \$1.6 million and spans approximately four years. This enabled the development and demonstration of technical feasibility to a prototypic network stage along with technology demonstration using both proprietary and commercial network simulations of the network routing solution. This technology in effect enables the rapid (less than a second) establishment of an operational network among several hundred (or even several thousand) communication nodes. SARA uses the network as a whole to avoid reliability issues that arise when using more centralized or even sub-network (mesh) communication approaches common to current commercial wireless approaches. This enables SARA-based networks to be very robust. As a result, this approach is nearly immune to a network wide failures or even significant parts of the network failing. Additionally, SARA enables the network owner to easily add or remove nodes from the network at will and at very low cost.

The goal of this project is to incorporate this technology into a network of sensor nodes used for industrial and commercial applications. This will enable end users of the sensors to modify the number and location of the sensors in use in their facilities quickly, efficiently and very cost effectively compared to wired installations or other wireless networking solutions that are currently available. The project team combines the unique strengths of Bluetronix Inc., the developer and provider of the key enabling technology, with those of Marlin Manufacturing Company, a significant supplier of industrial and commercial temperature sensing solutions, and those of two Northeast Ohio universities, Kent State University (KSU) and Youngstown State University.

The team is focused on initial deployment in industrial and commercial temperature sensing solutions (primarily thermocouples) due to temperature being the most often measured process variable in industrial and commercial applications. This includes integrating the technology into two Marlin product lines. This approach provides an established link to existing markets as well as the option to expand into new markets. Additionally, the team slates the hardware and software applied to temperature sensing to provide the platform for rapid application to other common industrial and commercial process variables (pressure, level, differential pressure, flow rate, acceleration, chemical species, conductivity, etc.) and thus rapid deployment to other markets.

The platform technology, SARA algorithms, has attracted investment (an initial \$50k from venture program), has been and continues to be considered for significant additional investment by that venture organization, Bluetronix will present the technology for funding at the Northwest Ohio Venture Tech venture fair in November, and Bluetronix has demonstrated the technology in an operational test for DARPA. Thus, Bluetronix, the supplier of the platform technology has achieved a measure of success in the level A, B, and C metrics to date.

This project clearly focuses on the goals demonstrating commercial prototypes and enter the market, helping Ohio

companies achieve cost and performance necessary for commercial success, delivering products to market and creating jobs during the course of the project and additional jobs thereafter, helping Bluetronix and Marlin attract additional investment to make the product lines successful, while also helping KSU and YSU provide an enhanced learning environment for the students who will implement this and other Ohio sensor technologies worldwide.



Parker Hannifin Corporation
Aerospace Group
Gas Turbine Fuel Systems Division
9200 Tyler Boulevard
Mentor, OH 44060 USA
Office 440 954 8100
Fax 440 954 8111

Proposed Project Title:

Piezoelectric Mass Flow Sensor for Online Control of Fuel Flow Schedule in Advanced Commercial and Military Gas Turbine Engines

Letter of Intent (LOI) Submitted to:
Ohio Third Frontier | Sensors Program 2010 RFP

Submitted by:
Parker Hannifin Corporation – Gas Turbine Fuel Systems Division
9200 Tyler Blvd.
Mentor, OH. 44060

Technical POC: Adel Mansour, Ph.D, MBA amansour@parker.com, 440.954.8171
R&D Team Leader

Adel Mansour 11/03/09

Contracting POC: Gary Glotzbecker, gglotzbecker@parker.com, 440.954.8116
Contract Administrator

A handwritten signature in black ink that reads "Gary Glotzbecker".

Estimated Period of Performance: 2 years

Estimated Grant Funds to be Requested: \$300,000

The project will lead to the development of a sensor for measuring mass flow rate. The sensor can be used in a wide range of applications including fuel metering in commercial and military gas turbine engines, industrial process control, and large number of other applications. Parker proposes to use its piezoelectric platform technology, currently used for flow control valves, to develop a mass flow sensing device. Parker estimates that the market potential for the mass flow sensing device will easily reach \$10 million following the first two years after introduction into the market place. This sensor development program will be conducted in Mentor, OH and will benefit the local economy in Northeast Ohio. The mass flow sensor will be developed to cover a wide variety of styles, sizes and prices and will be tailored to fit a number of specialized applications.

In this project, we propose to mature the flow sensing technology to a high technology readiness level (TRL) and ready the technology for deployment in the market place. Parker will use its mechanically amplified piezo-electric platform as the core building block for the mass flow sensor. This technology, named "ViVA" technology, is currently being used to control flow valves. For these valve applications, metering is achieved by applying a control voltage to a piezo element, which results in a mechanical displacement at the end of a mechanical amplifier. The resultant displacement and force are used to drive a metering spool which controls the flow rate of the metering valve. For the mass flow sensing application we propose to take advantage of the "bi-directionality" of the piezoelectric effect. i.e., when the piezo material is placed under mechanical load, it generates an output voltage signal that is proportional to the loading force. The mechanical load to the piezo stack in a flow sensing arrangement is imparted by flow motion. From basic fluid dynamics, it was derived that this load is proportional to the mass flow rate. In this novel design, a mechanical amplifier is used to amplify the force applied to the piezo stack and increase the dynamic range of the mass flow sensor. The sensor is expected to be very repeatable and capable of measuring flow over a wide range of flow rates and with a very short response time.

The total worldwide market for mass flow sensing is well in excess of \$4 Billion. Market projections for the current mass flow sensing device are expected to be well in excess of \$10 million dollars/year following the first two years after product launch. Parker Hannifin is a global company headquartered in Cleveland Ohio. Parker Hannifin has production operations in 40 countries around the world. Our production plants are supported with an extensive network of distribution channels. Should we prove the viability of technology, we anticipate a very fast and effective market penetration with significant sales growth for many years to come.

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Think-A-Move, Ltd.
23715 Mercantile Road, Suite 100
Beachwood, Ohio 44122
t 216/765-8875
f 216/765-8874
www.think-a-move.com

Ohio Department of Development
Technology and Innovation Division, Attention: OTFSP
77 South High Street, 25th Floor
Columbus, OH 43215
Via e-mail

Subject: 2010 OTFSP LOI

Dear Sir:

This is our letter of intent to submit a full proposal for the 2010 OTFSP due 12/7/09. Specific company information for the lead applicant is:

Think-A-Move, Ltd.
23715 Mercantile Road, Suite 100
Beachwood, Ohio 44122
216.765.8875
Ohio Limited Liability Corporation
Contact person: Jim Harris
E-mail address: jimharris@think-a-move.com

Proposed Project Title: **Enhanced Sensor Functionality for Military Communication and Device Control Systems.**

Estimated Grant Funds to be requested: \$625,000

Known Collaborators: Advanced Basic Communications, Inc, an Ohio Company. It is anticipated that other collaborators, some of which are Ohio companies, will be included in the final proposal

Proposal Summary

A wide variety of sensors are used in military communication and robotic systems. The objective of this project is to expand the roles of military sensors by enhancing their functionality and integration with these systems. Expansion of the roles of sensors will focus on two areas: increasing the functionality of military headset microphones and enhancing the man-machine interface with military robots by improving the integration between the sensors on the robots and their controls.

- **Military headsets.** Think-A-Move (TAM) has developed and is selling a military radio headset. These headsets are also used by local and state law enforcement groups. The headset has two earpieces and is configured with three microphone sensors: one sensor is pointed into the ear canal and captures voice for communication purposes; the other two sensors are on the external surfaces

of the earpieces and are used for situational awareness. The functionality of these sensors will be expanded under this project.

- The internal microphone sensor will also be used to capture voice for speech recognition and speech control. An embedded version of TAM's speech control system (SPEAR) will be developed which will allow speech control to run on radios. This may be either a small footprint speech control system running on an embedded Linux/Windows platform or a version that runs on a DSP system. TAM has successfully developed SPEAR on Linux and Windows operating system, to controlling military robots in field conditions. This new version will build on existing technology and will add functionality to communication systems.

Military radios are becoming more sophisticated through the addition of microprocessors and data access capabilities. The ability to use voice commands to control radio functions for voice and data will create substantial benefits for soldiers. Soldiers will be able to perform tasks more rapidly and hands-free – extremely important in battlefield conditions.

- The functionality of the external microphone sensors will expand to support the safety of soldiers. Currently the external microphones allow the soldier to hear environmental sounds – providing situational awareness. Under this project algorithms will be developed which will predict if the environmental sounds captured by these sensors pose a threat to the soldier, while preventing hazardous environmental sounds captured by these sensors, such as explosion, from damaging the hearing of soldiers. If there is a potential threat, a warning will be sent via radio to others on the network.

- **Man-Machine Interface.** TAM has developed a speech control system (SPEAR) for controlling military robots and is currently in field trials with this system. This system captures a soldier's voice via an in-ear microphone sensor, and then uses its speech recognition engine to generate speech commands for controlling the robot. The robot, in addition to performing these tasks, contains numerous sensors – for both monitoring the robots performance and for capturing information critical to mission performance. This information is currently displayed on the robot's control unit screen.

Under this project the interaction between the sensors and the soldier will be enhanced to improve performance. A speaker will be added to the SPEAR earpiece. Algorithms and parameters will be developed which will determine if information captured via the robot sensors warrant an alert to the soldier. If an alert is appropriate, it will be issued to the soldier via the earpiece speaker. The soldier can then more quickly take action based on these alerts. Additionally, if an alert is high enough priority, the message is also broadcasted to the other squad members as well. This provides extra time, as the operator does not have to repeat the alert.

In summary, under this project, TAM will expand the functionality of sensors in military communications and control systems: creating substantial efficiencies for soldiers and improving their safety.

Please let us know if you have questions concerning this letter of intent.

Best Regards,

Jim Harris
President & CEO
Think-A-Move, LTD

BJR Sensors

**Letter of Intent
From
BJR Sensors, LLC
To
Ohio Third Frontier / Sensors Program**

Lead Applicant:

**Bob Patterson
CEO
BJR Sensors, LLC
10940 Girdled Road
Concord Township, Ohio 44077
Phone / Fax: 440-352-0113 (24/7)
E-mail: RCPC111@aol.com**

Project Title:

Provide a New, Low Cost NOx Combustion Gas Sensor for Industrial Applications

Estimated Grant Funds to be requested:

\$949,480

Known Collaborators:

**Roger Sustar
President
Fredon Corporation
7911 Enterprise Drive
Mentor, Ohio 44061
Phone: 440-951-5200
E-Mail: Roger.Sustar@Fredon.com**

**Vincent Gard
Principal Engineer
GTI
1700 South Mount Prospect Road
Des Plaines, Illinois 60018-1804
Phone: 847-768-0785
Cell: 847-281-6962
E-mail: vincent.gard@gastechnology.org**

BJR Sensors

Project Summary:

NOx Background

The measurement of NOx has become more critical as EPA regulations tighten and fuel costs continue to rise. The need for better fuel efficiency without generating any undesirable emissions such as NOx and CO is now at the forefront of industry needs.

Government and industry have spent considerable time and money over the past 10 years in an effort to develop the technology to measure NOx. Los Alamos National Labs, Bosch, University of Florida and others have concentrated on developing electrodes for oxygen sensors that would be able to react more selectively with NOx. These efforts have made some inroads in measurements but had severe limitations especially in not being able to measure in a low ppm (parts per million) range and the data drifted severely so that they were not practical.

The only NOx sensor that has been commercially installed was from NGK (Japan). This is a very complicated sensor to manufacture due to its multilayer design with multiple sealed cavities. Detection of NOx requires current measurements in a nano-amps range, which is technically challenging and subjected to strong interference from the much stronger sensor heater currents. Significant reliability issues were raised with the sensor applications in that field. At the moment there is no reliable commercial sensor available for in-situ NOx measurements in combustion applications.

For power plant boilers there is a desire by the EPA to monitor and control NOx and CO. After five years of research, BJR Sensors, LLC has demonstrated that with its patented technology, a commercially available oxygen sensor which already has a proven and rugged design can be modified to measure both gases. The verification testing conducted to date has shown measurement down to 5ppm of NOx is attainable. This testing has been done at multiple locations such as Los Alamos National Labs, Siemens Corporate R&D, and GE.

This technology needs to be put into a commercial package and tested in actual applications such as boilers and power plants. If successful, it will lead the way to be the first reliable sensor to measure NOx and CO emissions and allow for further improvements in combustion control reducing fuel consumption and NOx emissions.

Time is of the essence for this project to start. Siemens has expressed more than a little interest in this patent and it is anticipated an offer will be forthcoming to buy all of the intellectual property rights.

It is the intent of BJR Sensors to try and save the power generation and boiler applications so as to create job growth in Northeast Ohio. The world market for this type of sensor is over \$100,000,000. With this grant we can start the process to manufacture within 6 to 12 months.

OTFSP 10-721



**Department of
Development**

**Third Frontier Sensor Systems
Letter of Intent**

Lead Applicant: Rockwell Automation
Daniel L. Carnahan, Project Manager
1 Allen-Bradley Drive
Mayfield Hts, OH 44141
440.646.7325 dlcarnahan@ra.rockwell.com

Proposal Title: **DISTRIBUTED IMAGING SYSTEM FOR INDUSTRIAL AUTOMATION**

Budget Request: \$1,000,000 / 2 years

Collaborators: Professor **Kenneth A. Loparo** kal4@case.edu
EECS Department 216.368.4115
Case Western Reserve University
10900 Euclid Avenue
Columbus, OH 44106

Dave Beck, Executive VP dave.beck@eisc.org
Center for Innovative Food Technology 419.534.3710
Edison Industrial Systems Center
5555 Airport Highway, Suite 100
Toledo, OH 43615-7320

Professor **Shivakumar (Shiva) Sastry** ssastry.2@uakron.edu
Dept of Electrical and Computer Engineering 330.972.7646
The University of Akron
Columbus, OH 44325

Correspondence author: dlcarnahan@ra.rockwell.com 440.646.7321 / fax 440.646.7327

Distributed Imaging System for Industrial Automation, Ohio Third Frontier Sensors Program

There is a growing need to regularly assess the state of production machinery and to monitor products and material during manufacturing. Development results in micro-electronics, optics, software and microprocessors has led to the development of powerful, low-cost general purpose imaging-processing platforms with embedded logic. These imaging-processing systems include an integral processor and firmware capable of performing real time image processing. Image processing capabilities include extracting multiple bar codes from a single image, performing image filtering and feature extraction algorithms, and performing image correlation. The proposal team members have researched commercial bar code-imaging systems and recognize these to be an important enabling technology for a compact, low-cost distributed commercial sensing system that can be readily deployed in manufacturing plants. An adaptable imaging system can fill important gaps in on-line sensing for production management, process control, inventory management, safety, security and quality assurance. The capabilities needed to permit rapid deployment of a commercial robust distributed manufacturing imaging systems are:

1. Robust industrial network interface based on open standards
2. Flexible application development platform and toolset
3. Rugged, low-cost industrial package

We have identified several low cost, camera-decoder modules that can form the basis for an integrated, distributed imaging commercial system. This investigation was conducted in response to a specific customer sensing requirement. Our initial development work has identified three additional customers in different markets with significant sensing applications that can be readily addressed with this same sensing platform.

The devices identified do not require careful alignment of the camera with the target and they have an outstanding depth of view that avoids the need for manual focusing or the cost and complexity of automatic focusing. The imager captures a high resolution image for local embedded processing and can optionally provide the image to a remote location. This is possible due to the high-resolution imaging chip and lens system that is integrated with a commercial microprocessor running a real-time OS.

Laboratory testing has confirmed the ability of a compact commercial camera module to quickly and accurately capture and process a product image and transfer the high resolution image for subsequent advanced filtering, edge detection, and feature extraction. This versatile system has demonstrated effective results with distorted and partially occluded image sources, under varying lighting conditions, and with a wide range of camera distances far beyond typical bar code readers. In fact our image processing algorithms have extended the useful range of the camera beyond the lens specifications! Initial development has been done to demonstrate the feasibility of connecting multiple camera modules together using a common industrial automation network and controlling all the cameras with a single commercial industrial controller. The camera network has also been extended to include a wireless interface using an open network architecture. The components demonstrated in the laboratory will form the basis for an extensible, low-cost distributed imaging system for industrial automation. The high level of interest seen by major US manufacturers with a strong presence in Ohio underscores the importance of this technology and the need to quickly transition the laboratory components to a robust, adaptable commercial product.

Rockwell Automation currently has a very successful industrial sensors business that is committed to commercializing this technology. The existing sensor engineering, commercialization, manufacturing, marketing, sales and support organization will insure the proposed distributed imaging system is both a technical success and a commercial success that will positively impact many manufacturers in Ohio



November 3, 2009

Ohio Department of Development
Technology Division
77 South High Street
Columbus, Ohio 43215

Re: 2010 OTFSP Letter of Intent
For the: **Hardened Sensor Networks Project**
Submitted via: Email to: OTFSP2010@development.ohio.gov

To the Ohio Department of Development:

Please be advised that, on behalf of Zethus Software, LLC, I wish to submit this Letter of Intent (LOI) for the 2010 Ohio Third Frontier Sensors Program.

- Lead Applicant: Zethus Software, LLC
- Contact Person: Brad A. Myers
Chief Executive Officer
Mobile: 330-727-1171
bmyers@zethussoftware.com
- Address: 241 West Federal Street
Youngstown, Ohio 44503
- Project Title: Hardened Sensor Networks Project
- Grant Funds Requested: \$1.5 million
- Known Collaborators: Youngstown State University: www.yzu.edu
Ohio Supercomputer Center: www.osc.edu
Youngstown Business Incubator: www.ybi.org

Zethus Software, LLC

Hardened Sensor Networks Project

2010 Ohio Third Frontier Sensors Program

Project Summary

Project: Zethus Software, LLC will provide a unified, secure and resilient hardened sensor network system that is easy to use, setup and manage. The current generation of sensor nodes is not engineered for harsh environments found in military and heavy industry applications; or for uncontrolled environments such as outdoors or in moving vehicles. Zethus will commercialize a hardened sensor network system that can be used in these types of environments. Because the portable applications are particularly sensitive to power consumption, this process will include design through production of systems optimized with respect to power consumption.

The Proposed Technology Path: The Zethus CyberLabNet system is a server-less cloud system composed of many low cost, low power nodes (computer devices) – sensor/instrument appliances. Plug them in and they self-assemble into a unified service that includes fail-over, load-balancing, redundancy, self-healing, and parallelism. It appears as a single powerful “server” but is setup simply by plugging in a set of appliances. It is inherently resilient since data is redundantly stored (by policy), self-healing, and includes fail-over. However, the current generation hardware is commercial grade (i.e., it is designed for use in controlled environments such as offices and labs) and thus it is not hardened for the conditions commonly found in harsh environments such as temperature, humidity, vibration, mechanical loads, etc. To design and qualify it for such environments will require reengineering the hardware to mill spec (military specification) and complementary standards for ruggedized equipment. This will include carrying out extensive testing to demonstrate that the assembled systems meet the requisite standards. As part of this effort, hardened connections between the sensors and the network will have to be designed and tested (e.g., with respect to electromagnetic spikes and other RF and related problems). In addition, networks in rugged environments typically experience quantitatively and qualitatively different signal interferences than those in home/office environments. Thus, design and testing to ensure that the enhanced software/hardware system reliably copes with such signal interruptions with minimal user oversight will be carried out.



November 3, 2009

Ohio Department of Development
Technology Division
77 South High Street
Columbus, Ohio 43215

Re: 2010 OTFSP Letter of Intent
For the: **CyberLabNet Automated Sensor Networks Project**
Submitted via: Email to: OTFSP2010@development.ohio.gov

To the Ohio Department of Development:

Please be advised that, on behalf of Zethus Software, LLC, I wish to submit this Letter of Intent (LOI) for the 2010 Ohio Third Frontier Sensors Program.

- Lead Applicant: Zethus Software, LLC
- Contact Person: Brad A. Myers
Chief Executive Officer
Mobile: 330-727-1171
bmyers@zethussoftware.com
- Address: 241 West Federal Street
Youngstown, Ohio 44503
- Project Title: CyberLabNet Automated Sensor Networks Project
- Grant Funds Requested: \$1.5 million
- Known Collaborators: Youngstown State University: www.yasu.edu
Ohio Supercomputer Center: www.osc.edu
Youngstown Business Incubator: www.ybi.org

Zethus Software, LLC
CyberLabNet Automated Sensor Networks Project
2010 Ohio Third Frontier Sensors Program
Project Summary

Project: Zethus Software, LLC (a Youngstown Business Incubator company) will provide a unified, secure and resilient sensor and instrument collaboration system that is easy to use, setup and manage. Collaboration includes secure, organized, shared use of sensors, instruments, and data. Role based access policies and granular access control are used to provide the organization and authorization required for highly collaborative systems, including secure managed storage of any data or documents.

Distinctions:

- ***Server-less cloud system:*** Composed of many low cost, low power nodes (computer devices) – sensor/instrument appliances. Plug them in and they self-assemble into a unified service that includes fail-over, load-balancing, redundancy, self-healing, and parallelism. It appears as a single powerful “server” but it is set up simply by plugging in a set of appliances. It is very resilient since data is redundantly stored (by policy), self-healing, and includes fail-over.
- ***Non-invasive:*** The system requires no installation on the instrument (or computers controlling the instrument) or sensors and the data is stored in a secure, managed and scalable system of storage nodes.
- ***Ease-of-Use:*** New sensors and instruments can be added by just plugging in a new node – and permitted users can immediately begin use because of the role based access policies. The system is resilient so if a node is off for any reason, the system continues to work uninterrupted.
- ***Data Management:*** Secure managed storage of data and documents includes: tag and search, versioning, retention policies, and access policies & monitoring. Being able to securely store, manage, and share data and documents is key for any collaborative system.
- ***Integration:*** Tools can be used anywhere a browser can and don’t require any installation. Because it is a unified system, all sensors, instruments, and data are accessed from one interface and can be fused to allow a more complete collaboration. For example, one can control an instrument, while watching it on a video camera and monitoring ambient environmental conditions.

Hansen, Andrew

From: hongyan he [hehongyan1974@gmail.com]
Sent: Wednesday, November 04, 2009 12:37 AM
To: OTFSP2010
Subject: 2010 OTFSP LOI
Attachments: Project Summary.doc

Dear OTF Officer:

I am writing to inform OTF of our intent to submit a 2010 OTFSP proposal in response to the recent announcement of RFP.

1. The Lead Applicant:
BioLOC LLC.
1381 Kinnear Rd. Suite 100
Columbus, Ohio 43212
Phone: 614-329-1394
2. Contact person: Dr. Hongyan He
Email: hehongyan1974@gmail.com
3. Project title: Microfluidic ELISA Sensor System for Biomedical Applications
4. Estimation of Fund Requested: \$850,000
5. Known collaborators:
TEC Institute, Fisher College of Business, The Ohio State University will provide incubation and managerial services for the new venture including interim executive leadership, administrative oversight, fund raising support, and technical and business development.
Advanced Research Technologies will provide market development and technology evaluation services.
OSU Medical Center will conduct clinical testing for analysis and comparison of conventional and CD-ELISA technologies.
Everfavor will design, fabricate and test the analyzer system and the automated sample-handling system by charging only the material and labor cost.
6. A project summary has been attached in this email.

Thank you for your help in administering this request,

Sincerely,

Hongyan He, Ph.D.
BioLOC LLC.

On 10/27/09, **OTFSP2010** <OTFSP2010@development.ohio.gov> wrote:

I reading your Letter of Intent it appears that you may have some confusion regarding the Sensors Program and the previously offered ORCGP program which had an eligibility requirement of a previous SBIR award. The ORCGP program is not being offered in this fiscal year. The information provided about your SBIR award has no relevance to this program. Please also be aware of the Cost Share requirements. Previous expenditures of the SBIR award would not be eligible. Before deciding to submit a full proposal to the Sensors Program I would encourage you to fully understand the requirements of the Program as described in the Request for Proposals and Appendices.

11/12/2009

Andrew Hansen, PhD

Biomedical Program Administrator

Technology and Innovation Division

614.466.0270

Andrew.Hansen@development.ohio.gov

Project Summary

Miniature medical systems such as 'lab-on-a-chip' (LOC) devices and advanced drug delivery systems are a rapidly-growing market, with annual sales of >\$20 billion and a high growth rate. Currently, the most prominent market niche is genetic, protein, and immunoassay analyses for pharmaceutical development. Applications on the horizon include advanced medical diagnostics and therapy, toxicology, and homeland security. Although microarray and microfluidic biosensors/chips have reached commercialization in recent years, highly automatic and efficient devices that can be mass produced at low-cost are still very few on the market.

We propose to commercialize a novel and affordable proteomic sensor system for rapid disease detection, diagnosis and therapy by leveraging the existing technical strengths in BioMEMS and polymer/biomaterial engineering at the Ohio State University. Product development and commercialization will be carried out by the start-up company, BioLOC focusing on a fully automated Compact Disc (CD)-Enzyme-Linked ImmunoSorbent Assays (ELISA) protein detection and diagnosis system for a combined US market of over \$1B annually. OSU medical center will perform clinical testing for analysis and comparison of conventional and CD-ELISA technologies. OSU's Center for Entrepreneurship and the Technology Entrepreneurship and Commercialization Institute will provide business support and business project management for the proposal team. BioOhio, located at TechColumbus, will also support integration of BioLOC into the emerging Ohio biotechnology market.

This disc-like biochip system is built on patented nanobiotechnology platforms developed in the Center for Affordable Nanoengineering of Polymeric Devices (CANPBD) at OSU. The CD based immunoassay chips are a joint project with several Ohio and non-Ohio companies including world largest CD producer, RITEK. BioLOC has developed the total instrumentation, including an inexpensive CD-ELISA chip and a highly automated analyzer. For this system, the proposed research and commercialization efforts will focus on β -testing at OSU's Medical School and Hospital, and further data generation for both non-clinical and clinical applications with the ultimate goal of pushing these products close to market entry.

In summary, a multidisciplinary collaboration with OSU and Ohio and non-Ohio biotechnology companies will allow BioLOC to convert a number of 'demonstrating to market entry' technologies into new products for the >\$2B/yr. well-defined medical and pharmaceutical device markets, and facilitate job creation in Ohio.



Department of
Electrical and
Computer Engineering

Wu Lu, Associate Professor
205 Drees Laboratory
2015 Neil Avenue
Columbus, OH 43210-1272

Phone 614-292-3462
FAX 614-292-7596

November 3, 2009

Ohio Third Frontier Sensors Program (OTFSP)

The Ohio Department of Development
Technology and Innovation Division
77 South High Street, 25th Floor
Columbus, OH 43215

Subject: Letter of intent for the OTFSP 2010 RFP

To whom it may concern,

The Ohio State University is pleased to submit this Letter of Intent to submit a proposal in response to the 2010 OTFSP RFP.

Lead Applicant:

The Ohio State University
2015 Neil Avenue
Columbus, Ohio 43210

Administrative Contact:

Ms. Jo Ellen Scherrer
Engineering Research Services
The Ohio State University
224 Bolz Hall, 2036 Neil Avenue
Columbus, OH 43210
Phone: 614-292-5277
Email: Scherrer.4@osu.edu

Technical Contact:

Prof. Wu Lu
Phone: (614) 292-3462
Mobile Phone: (614) 425-0231
Email: lu@ece.osu.edu

Project Title: Center for GaN-Based Chemical Sensors (CGBCS)

Estimated Grant Funds to Request: \$1,500,000

Collaborators:

Kent State University, Kent, Ohio 44242
LXD L.L.C., 7630 1st place, Cleveland, OH 44146

Project Summary:

The objective of this project is to develop and commercialize low cost, portable, fast response, reliable, and wireless data transmitting capable chemical sensors. The applications of these sensor devices

include hydrogen detection in fuel cell manufacturing or vehicles and for detection of heavy ions in groundwater, lakes, or rivers for environmental monitoring.

Problems to be addressed:

There is currently great interest in the development of hydrogen sensors for applications involving leak detection of hydrogen in fuel cells in combustion engines of vehicles and in the manufacturing processes of hydrogen production, delivery, and storage. One of the most important aspects desired by the end user for such a sensor is – the ability to selectively detect hydrogen at high temperatures or harsh environments. Also, heavy ions like mercury and their compounds are well known to be poisonous. Every year a large amount of mercury compounds are introduced to our environment through natural events and human activities. High levels of mercury contamination have been positively linked to increased rates of birth defects, nervous system damage, and brain tumors. Therefore, the development of low cost, portable, fast response, and wireless data transmitting capable hydrogen and mercury sensors that can work reliably in thermally or chemically harsh environments is highly desirable.

Approaches:

In this OTFSP Program, we plan to validate AlGaIn/GaN HEMT sensor technologies that have been innovated at Ohio State and Kent State and integrate these sensors with a wirelessly transmitting and receiving system for measurement of very low concentrations of hydrogen at high temperatures or mercury in ground water, lakes and rivers. AlGaIn/GaN HEMT based sensors have several important advantages over other semiconductor based sensors, since they can operate over a broad range of temperatures and in harsh environment due to their chemical inertness to all known acids and bases. These nitride HEMT based sensors can also have very short response times and amplify the detection signals. Since the AlGaIn/GaN HEMT technology also forms the basis for next generation microwave communication systems, different integrated sensor/wireless-chip schemes are possible to match variety of applications.

Commercial Plan and Other Benefits:

The developed sensor technologies will be commercialized at LXD, L.L.C. LXD is the first liquid crystal display company in US history. Since its inception, LXD has been routinely commercializing new products and emerging as a US leading display and optical component supplier. While currently the main business of LXD is focused on LCD manufacturing, LXD has set up a new objective since 2008, to develop and commercialize products based on advanced research with collaboration of universities, for generating new branch of long-term revenue at LXD. The company has successfully developed and fabricated glass liquid cells for pathogen detection, with collaboration of Crystal Diagnostic at Kent, Ohio, and Kent State University. LXD's principals have a proven track record of new product developing and entrepreneurial success, particularly in providing advanced technologies to customer deliverables.

In addition to environmental protection, fuel cells, and hydrogen storage, the proposed R&D effort will benefit chemical sensor technologies in general by providing a novel, portable and robust approach for remote chemical and biological sensing. This technology can be used for other applications in the area of gas, liquid, bio- and chemical detection with a wide range of applications in many fields including medicine and health, homeland security, defense, automotive, and aero-space industries, all of which are strategically important not only on Ohio's economical growth and development, but also more importantly, the quality of life.

Sincerely Yours,



Wu Lu, Associate Professor
Department of Electrical and Computer Engineering, The Ohio State University

Ohio Third Frontier Sensors Program (OTSFP) – Letter of Intent

Lead Applicant's Name: Cleveland Clinic

Contact Person: Vadim F Lvovich, Ph.D.

Address: 9500 Euclid Ave, Mail Code ND20, Cleveland Clinic, OH 44195

Office Phone: (216) 445-3577

Fax: (216) 444-9198

Email: lvovicv@ccf.org

Proposed Project Title: Electrochemical Diagnostic Device for Evaluating Clinical Thrombosis Risk

Estimated Grant Funds to be requested: \$1,000,000.00 US

Known Collaborators:

CWRU Department of Chemical Engineering
ZIN Technologies, Inc.

Summary of the Proposed Project:

This proposed OTSFP project is dedicated to the commercial near-term development of a clinical device for electrochemical detection and characterization of cell-derived microparticle biomarkers (MPBs) in blood, biological fluids or buffers. Knowing the specific cellular source of MPBs in the blood as well as their concentration provide important diagnostic and prognostic information in many disease states, such as cancer, lupus, sickle cell disease, acute myocardial infarction, stroke, diabetes, and renal failure. Well-known pathogenic mechanisms linking MPB specifically to venous and arterial thrombosis give this project high clinical value. Advanced *in vitro* detection of MPBs will provide direct, rapid, efficient and cost-effective diagnostic method and corresponding medical device.

We plan to develop a specific electrochemical diagnostic device for detection and characterization of cell-derived MPBs that will be applicable to clinical samples (blood and biological fluids) and as a laboratory research tool for thrombosis diagnostics. The current diagnostic detection technologies for MPB are based on light scattering and/or immunoassays and are inefficient, expensive, and inherently inaccurate. We plan to develop a commercial point of care prototype that will provide the benchmark diagnostic system for regulatory testing and eventual regulatory filing of the diagnostic MPBs. Commercial development will result in production of a miniaturized point-of-care clinical diagnostic platform device for a selective, sensitive, rapid and inexpensive diagnostics of cardiovascular, immunology and cancer related conditions.



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November 4, 2009

Ohio Department of Development, Technology Division
77 S. High St., 25th Floor
Columbus, OH 43216-1001

Subject: Letter of Intent for Ohio Third Frontier Sensors Program

To Whom It May Concern:

This letter provides notice of intent for NexTech Materials, Ltd. to submit a proposal to the Ohio Third Frontier Sensors Program RFP, which was released on October 7, 2009.

Applicant: NexTech Materials, Ltd.

Address: 404 Enterprise Drive
Lewis Center, OH 43035

Phone: (614) 842-6606

Contact Person: Scott L. Swartz, Ph.D.
Chief Technology Officer
s.swartz@nextechmaterials.com

Project Title: *NO_x Sensors for Diesel Engine Emissions Systems*

Known Collaborators: to be determined

Estimated Dollars: This project is estimated to be a \$2,000,000 effort, with \$1,000,000 of Third Frontier Research and Development funds and \$1,000,000 of cost share funds.

Summary: This project will involve development of sensors for monitoring NO_x concentrations in diesel engine exhaust. Such sensors are critically needed in order to meet pending emissions regulations. The work on the project will involve application-specific testing of prototype NO_x sensors, fabrication of fully packaged prototype sensors, and field testing of these sensors in conjunction with Tier-1 automotive and truck manufacturers, and establishment of quality control and reliability testing protocols. The technology to be implemented in the project is based on NexTech's patent-pending NO_x sensor materials and device platforms.

Letter of Intent to Submit a Proposal for the FY 2010 Ohio Third Frontier Sensors Program

Prospective Lead Applicant's Name: Asis Banerjie, Ph.D.

Organization's Address: Ovation Polymers
1030 West Smith Road
Medina, Ohio, 44256
www.opteminc.com

Contact Person: Arun Venkatesan, Ph.D.
Phone Number: 330-723-5686
Email Address: avenkatesan@opteminc.com

Proposed Project Title: "A customizable sensor system for non-invasive bio-signal measurement for patient care & wellness"

Estimated Grant Funds to be requested: \$ 1,000,000

Collaborator: Jim Douth
EBO Group Inc.
TransMotion Medical Inc
1441 Wolf Creek Trail
Sharon Center, OH 44274
www.ebogroupinc.com
www.transmotionmedical.com

Collaborator: Prof. Dan Simon
Cleveland State University
Department of Electrical and Computer Engineering
2121 Euclid Avenue, SH 332
Cleveland, Ohio 44115-2214
www.csuohio.edu

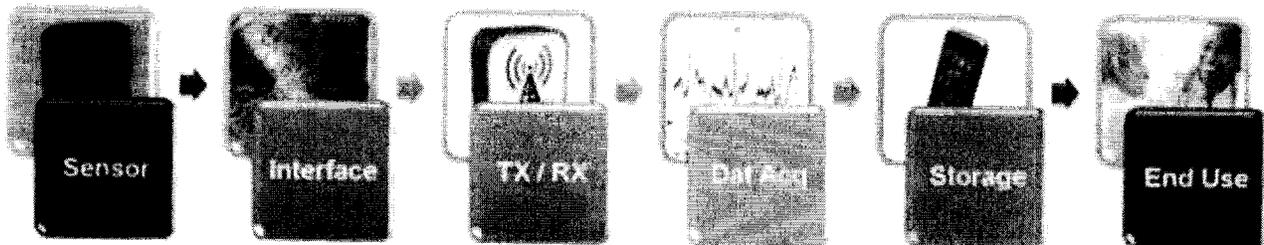
Collaborator: Dragan Dugandzic
Omnitek LLC
23775 Commerce Park Road, Suite 6
Beachwood, OH 44122
www.omnitekllc.com

Summary of Proposed Project:

Ovation Polymers (OPTEM), the lead applicant, is looking for opportunities and assistance for the development and commercialization of its unique sensor product.

Our sensor system is based on OPTEM's patented and commercialized OpteSTAT™ nano-technology platform. OpteSTAT™ is a family of polymer and carbon nano-tube composites and compounds.

OPTEM's product is a Simple Bio-Telemetric Total Information Capture System and is a complete integrated platform (see figure) that can be customized for various bio-medical applications.



The sensor component of platform is flexible, conformable and can be integrated into a wide variety of user environments, without affecting the users' quality of life.

Constant innovation and rapid commercialization has been the backbone of OPTEM's successful products. The sensors will be evaluated and optimized using fundamental characterization techniques at Cleveland State University's Department of Electrical and Computer Engineering (CSU).

Omnitek LLC has been a key partner in developing the interface through data acquisition components of our system and signal conditioning. Omnitek will extend its expertise and efforts by tailoring our system components for various end-user requirements.

Transmotion Medical Inc. (TMM) a subsidiary of EBO Group Inc. (EBO) has been manufacturing innovative specialty medical procedure chairs since 2003. TMM's multi-functional medical chairs are an ideal test-bed for integrating OPTEM's sensor system. This integration will create a "Smart Medical Chair" that will greatly enhance the quality of medical treatment and the expediency with which diagnosis and treatment are currently provided at hospitals (our end user). TMM/EBO will be a major partner in enabling the market entry of sensor system.

OPTEM, together with its Ohio-based collaborators, is asking for a \$1 million grant for its efforts, which will spur job creation and create an active environment for further development in the bio-medical applications arena, through the successful commercialization of our product - a remote monitoring sensor system for non-invasive bio-signal measurement for patient care & wellness.



communications

Nova Engineering
5 Circle Freeway Drive
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Tel: (513) 642-3000 Fax: (513) 642-3300
www.L-3Com.com/nova

File: L3_Nova_OTFSP_LOI_4Nov09.doc

Send via email to: OTFSP2010@development.ohio.gov

Subject Line: 2010 OTFSP LOI

Lead Applicant's Name: L-3 Communications Nova Engineering Inc. (L-3 Nova)

Address: 5 Circle Freeway Drive, Cincinnati, OH 45246

Phone Number: 513-642-3000

Contact Person: Kevin Bobier (Phone: 513-642-3124)

e-Mail Address: Kevin.Bobier@L-3Com.com

Proposed Project Title: Sensor And Fusion Enhancement (SAFE) Program

Estimated Grant Funds to be requested: \$1,000,000.

Known Collaborators: Science Applications International Corporation (SAIC)
University of Dayton Research Institute (UDRI)

One Page Summary: Starts on next page

Sensor And Fusion Enhancement (SAFE) Program Summary

The U.S. Military has been deploying Unattended Ground Sensor Systems (UGSS) around the world since the early 1970's. These monitoring systems are intended to serve as 'force multipliers' in enabling small groups of soldiers to conduct surveillance and reconnaissance missions over large geographic areas by emplacing seismic, acoustic, and/or magnetic sensors and monitoring them remotely via wireless communications. Unfortunately, the detection performance of these devices proved inadequate: they were often incapable of reliably distinguishing between legitimate targets (e.g., enemy troops) and wildlife. As a result, Commanders were unwilling to initiate action based on sensor systems' reporting. When ruggedized cameras became commercially available, they were added to the sensor systems with the objective of resolving the ambiguity in the detection results. However, the cameras' own detection algorithms, designed to discern changes from one image to another, couldn't reliably distinguish between a distant person in the background (only a few pixels) and a blowing blade of grass in the foreground (also only a few pixels). As a result, system complexity and cost were increased, but system False Alarm Rate (FAR) remained unacceptably high.

The fundamental problem with the above approach is that each individual sensor operates independently; therefore, while Sensor A and Sensor B might report conflicting detections that can't possibly correlate with any legitimate target type, the system none-the-less sends this information to the Monitoring Station (consuming precious battery power in the process) only to force an operator to make an impossible decision. To solve this long-standing problem, the proposed program targets the commercialization of an emerging sensor technology that extracts the detection information from *multiple* individual sensors and 'fuses' their data to form a *single*, highly reliable detection decision. Not only does this approach preclude the possibility of conflicting reporting from multiple sensors, but the collaboration enables the sensors *system* to not only identify the target type, but also its direction, rate of speed, etc. Moreover, in contrast to individual sensors, a fused sensor *system* can be used as a highly reliable trigger for the camera, ensuring that recovered images contain targets, not environmental effects.

The Lead Applicant, L-3 Nova, is the Prime Developer of an Unattended Tactical Imager (i.e., ruggedized camera UGSS) for the Marines' Tactical Remote Sensor Systems (TRSS) – the system is currently triggered by *individual* legacy sensors. L-3 Nova's Collaborator, SAIC, has developed a powerful Sensor Fusion Algorithm that produces the requisite high-confidence detection from a *collection* of sensors. In the prototype system, SAIC interconnected sensors using a Commercial Off-the-Shelf (COTS) networked radio – suitable for the laboratory, but not the battlefield. As a result, one of L-3 Nova's miniature, ruggedized radios has been targeted as a suitable replacement.

Therefore, the proposed program's primary objectives are (1) Integrate SAIC's sensors with L-3 Nova's radio to form a compact, rugged product suitable for military use, and (2) Implement SAIC's Sensor Fusion Algorithm within L-3 Nova's Tactical Imager to enable it to be triggered by a network of 'fused' sensors.



L-3 Nova's commitment to developing this technology is evidenced by a significant commitment of internal funds to augment the State of Ohio funding.

Hansen, Andrew

From: Wendy Lawson Scott [scott@orbitalresearch.com]
Sent: Wednesday, November 04, 2009 9:33 AM
To: OTFSP2010
Cc: Fred Lisy; Joe Snyder; Aaron Rood; Dan Kalynchuk
Subject: 2010 OTFSP LOI

To Whom it May Concern:

Orbital Research is pleased to submit this letter of intent to state Orbital's intent to produce and file a full proposal entitled, " Physiologic Assessment System" in response to the Ohio Third Frontier Sensors Program released on October 7, 2009.

1. Lead Applicant:
Orbital Research Inc.
4415 Euclid Avenue, Suite 500
Cleveland, Ohio 44103
216-649-0399 phone
216-649-0347 fax
2. Contact Person:
Joseph T. Snyder, Ph.D.
snyder@orbitalresearch.com
3. Project Title:
Physiologic Assessment System
4. Estimated Grant Funds:
\$400,000
5. Known Collaborators:
Cleveland State University
Kent State University
NASA Glenn Research Center
6. Proposed Project Summary:

Physiologic Assessment System (PAS) is a comprehensive medical monitoring system capable of measuring standard medical indexes such as ECG, oxygen saturation, respiration rate, oxygen consumption carbon dioxide production and nitrogen levels. The PAS project combines the sensing capability of the Lunar Health Monitor (LHM) and Portable Unit for Metabolic Analysis (PUMA). In the case of space flight, the long term monitoring capabilities of Orbital's LHM represents a significant change to bio-monitoring since the 1960's. NASA's PUMA is a low cost, portable metabolic measurement device. Through the inclusion of both the LHM and PUMA, PAS represents significant and substantial progress in biomedical monitoring in a clinical setting, in the field or in remote, extreme environments. PAS enables long term continuous monitoring and assessment of individuals required for the health care industry. PAS addresses the need for an easy to use monitoring system to enhance compliance. Additionally, PAS for hypoxia monitoring is the first step towards a realistic and

feasible approach for pilot health monitoring. PAS is a low cost, portable, comprehensive, and long term physiologic monitoring and assessment system which will increase compliance through ease of use. The small size, modular sensor integration concept and sophisticated data processing algorithms allow the system to be modified for a range of monitoring applications. Orbital and NASA Glenn have 6 issued and 5 pending patents (3 under consideration) on the enabling features of the PAS.

Wendy Lawson Scott
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