

02/18/14

Presentation:

University  
of Alaska

<TARGET><BILL></BILL><SUBJECT>02-18-14 Presentation  
University of Alaska</SUBJECT><COMM>HEDT28</COMM></TARGET>

# *Alaska State Legislature*

Representative Shelley Hughes, Chair

Session Address:  
Alaska State Capitol, Room 409  
Juneau, Alaska 99801-1182  
Phone: (907) 465-3743  
Fax: (907) 465-2381  
House District 8



Representative Lynn Gattis  
Representative Bob Herron  
Representative Pete Higgins  
Representative Craig Johnson  
Representative Kurt Olson  
Representative Lance Pruitt  
Representative Harriet Drummond  
Representative Geran Tarr

## *House Special Committee on Economic Development, Trade and Tourism*

### **AGENDA**

**February 18, 2014**

#### **1. Call to Order**

~Gavel~ Welcome members of the Economic Development, Trade and Tourism Committee.

#### **2. Roll Call**

- For the record, in attendance are: (representative xx, representative xx,... and representative xx)
- I would like to introduce Debbie Tillinghast, the committee recording secretary
- Info services person
- Ginger Blaisdell, committee aide for EDT

#### **3. AGENDA**

Dr. Helena Wisniewski, UAA Vice Provost for Research and Graduate Studies  
"Innovation Clusters and Economic Growth"

Dr. Dan White, UAF Associate Vice Chancellor for Research  
"Commercializing UAF Innovation, a Win-Win for Alaska"

Before we adjourn:

- Thursday, we'll wrap up our Arctic conversations by hearing from John Higginbotham from Ottawa CA and from the Marine Exchange of Alaska; both focusing on the new northern routes and the Arctic.

Thank you for wanting to be part of making Alaska one of the best economic environments in the nation. We are ADJOURNED." ~gavel~

## Ginger Blaisdell

---

**From:** Apache <apache@wwwjnu04.akleg.gov>  
**Sent:** Monday, February 17, 2014 2:59 PM  
**To:** LIO Juneau; Ginger Blaisdell  
**Subject:** Teleconference Order Form

**Meeting:** new

**Sponsor and/or Committee Name:** Economic Development Trade and Tourism

**Date of Teleconference:** February 18, 2014

**Start Time:** 11:15am

**End Time:** 12:45pm

**Chairing Site:** capitol

**Juneau Room:** 124

**Bill Information:**

**Streamed to akl.tv:** yes

**Executive Session:** no

**Contact Person:** Ginger Blaisdell

**Telephone Number:** 465-5265

**Email Address:** [ginger.blaisdell@akleg.gov](mailto:ginger.blaisdell@akleg.gov)

**LIO Sites:**

**May other LIO's add:** yes

**Offnet Name(s):**

I do not anticipate any offnet callers

**Other Information:**



## Commercializing UAF Innovation: A Win-Win for Alaska

Daniel M. White, PhD  
Associate Vice Chancellor for Research  
University of Alaska Fairbanks

### Technology Transfer Is Part of UAF's Educational Mission

#### Knowledge

- Publish data and research
- Educate students and the public

#### Technology

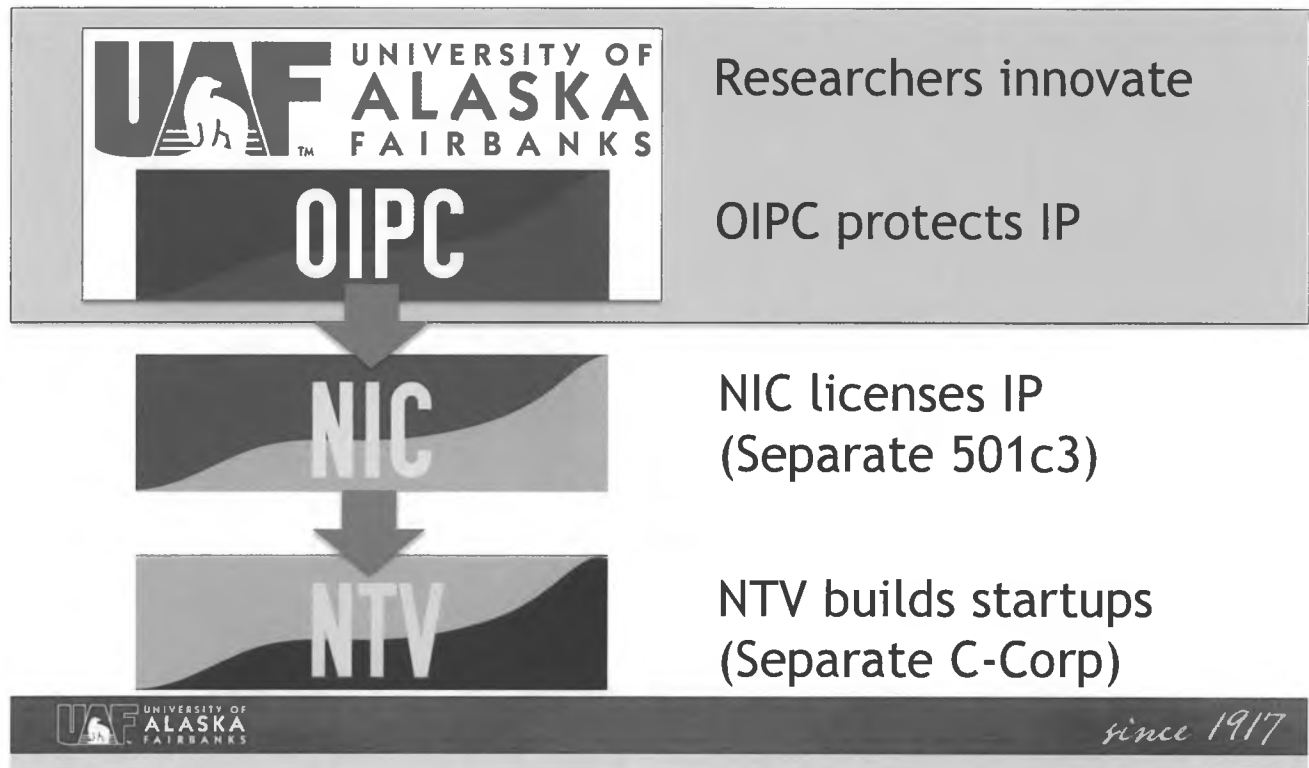
- Transfer of intellectual property to developers is technology commercialization

# Transforming Research into Technology



- Innovate
- Protect IP
- License IP
- Build startups

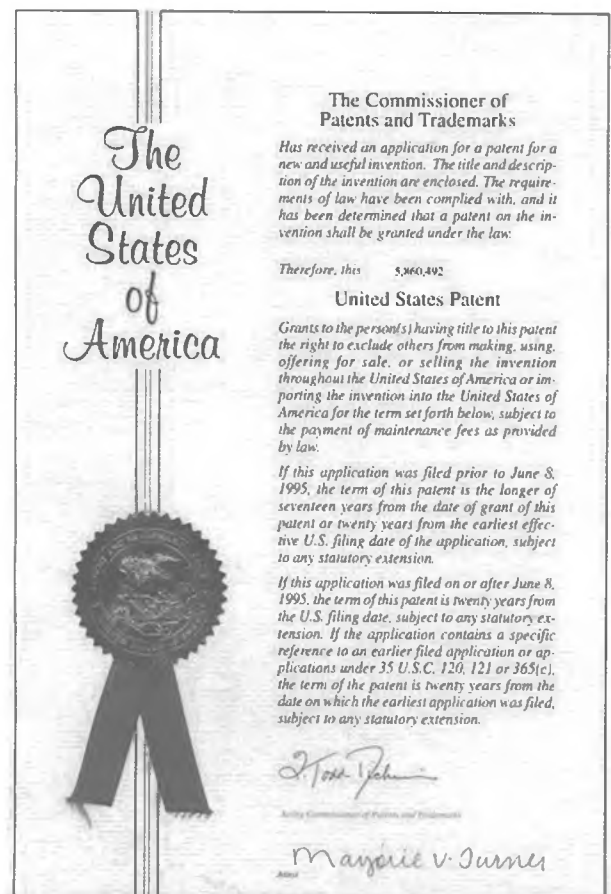
## UAF Structure for Commercializing Technology



# OIPC

The role of the Office of Intellectual Property and Commercialization (OIPC) is to:

- engage inventors,
- perform initial due diligence, and
- protect intellectual property



since 1917

# OIPC

## Engagement at UAF



# OIPC

## Engagement at UAF



**UAF** UNIVERSITY OF ALASKA FAIRBANKS



INVENTOR'S FORUM

Event Details  
Date: [illegible]  
Time: [illegible]  
Location: [illegible]

# OIPC

## Community Engagement

The Fairbanks Regional Economic Partnership gathers legislators, UAF inventors, and UAF staff to discuss how the University can engage on economic issues.

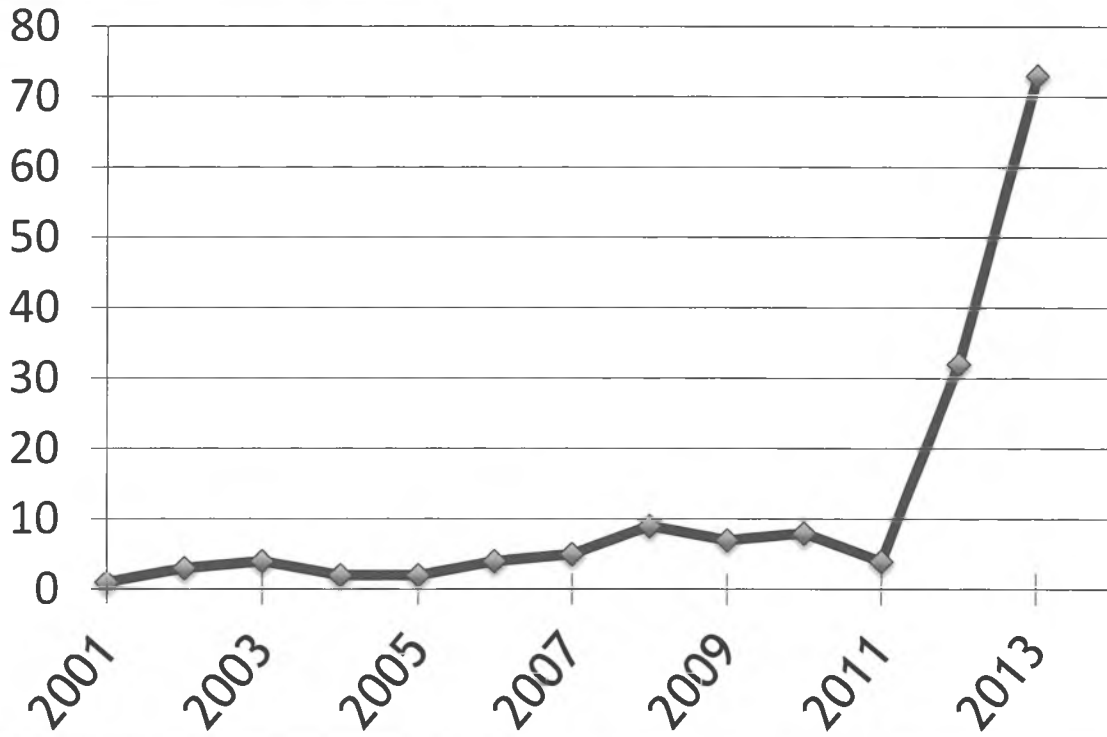


**UAF** UNIVERSITY OF ALASKA FAIRBANKS

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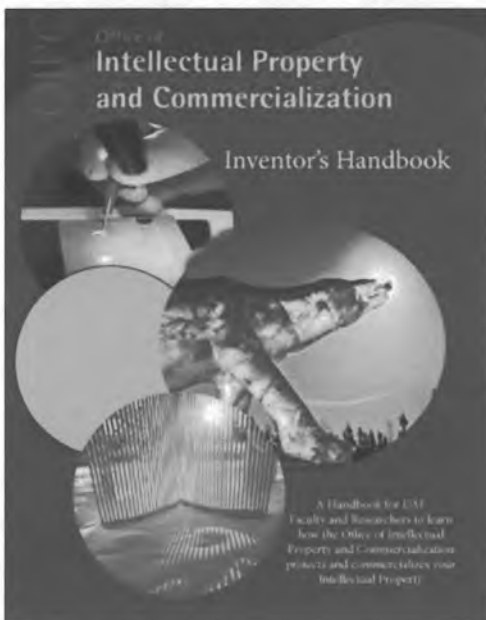
# OIPC

## Disclosures by Fiscal Year



# OIPC

## Inventor Support

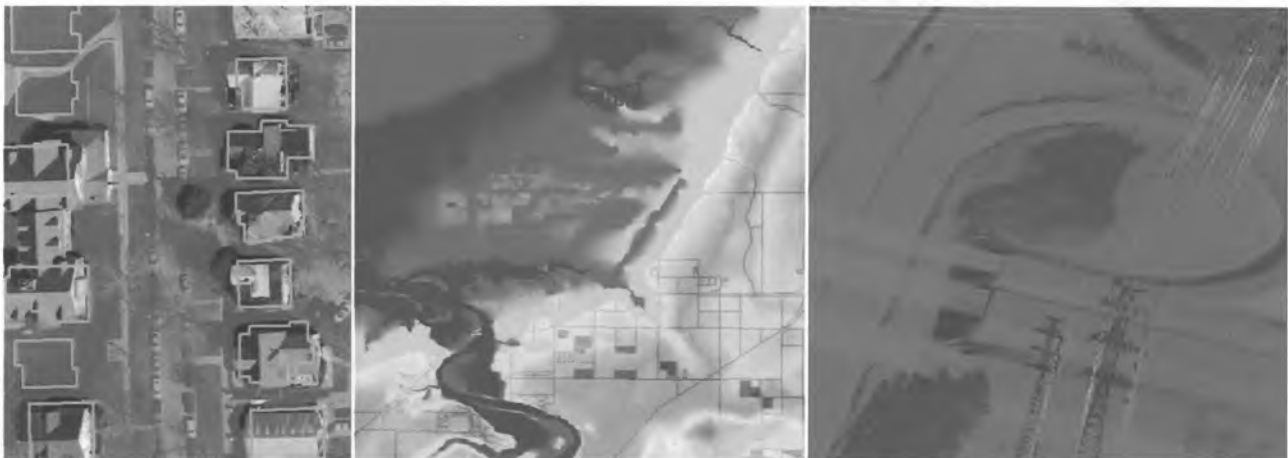


- Review grant contracts and MTAs for IP
  - 69 in 2013
- Execute non-disclosure agreements
  - > 55 in 2013
- File patents
  - 7 last calendar year
- Assign non-commercialized inventions back to inventors
  - 25 last year
- Develop conflict of interest plans for inventors creating startups

- Pharmaceutical formulation for therapeutic hypothermia
  - prevent ischemic brain injury
- DNA Sampling Method for Pathogen Diagnostics
  - Use one test instead of dozens
- The patented state filter
  - cleans digital signals and resolves the cocktail party effect

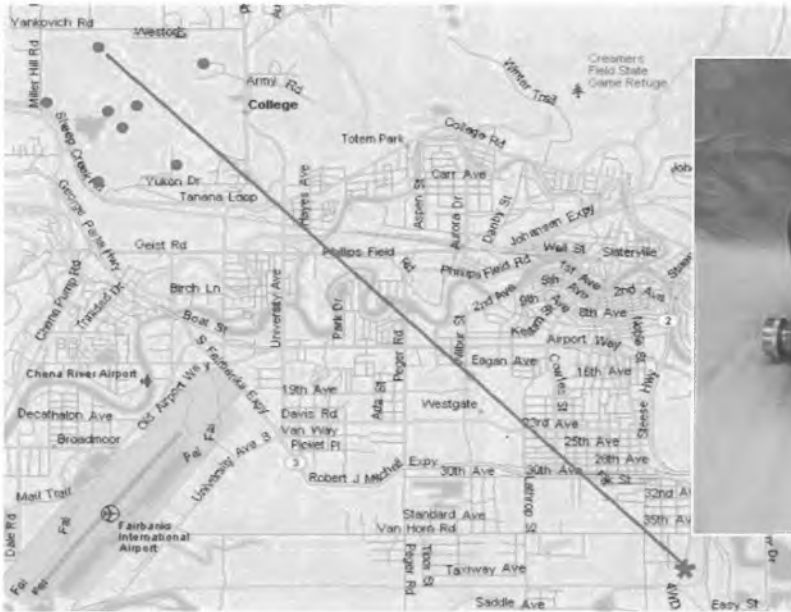


## Decision support tools for private sector and government use



# OIPC

# Sensors & Software



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## UAF Structure for Commercializing Technology



Researchers innovate

OIPC protects IP

NIC licenses IP  
(Separate 501c3)

NTV builds startups  
(Separate C-Corp)

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# Nanook Innovation Corporation Board Members



**Dan White**  
**President**  
Associate Vice Chancellor  
for Research, OIPC  
Director, and INE Director



**Lorna Shaw**  
**Vice-President**  
External Affairs Manager  
for Sumitomo Metal  
Mining Pogo, LLC



**John Zarling**  
**Treasurer**  
UAF Engineering Faculty,  
Retired



**Mike Powers**  
**Secretary**  
UA Board of Regents  
Secretary,  
CEO, Fairbanks  
Memorial Hospital and  
Denali Center



**John Burns**  
**Board Member**  
Former Alaska Attorney  
General,  
Owner, Burns & Associates,  
PC



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- Patents and software licensed
- Licensing can expand existing businesses

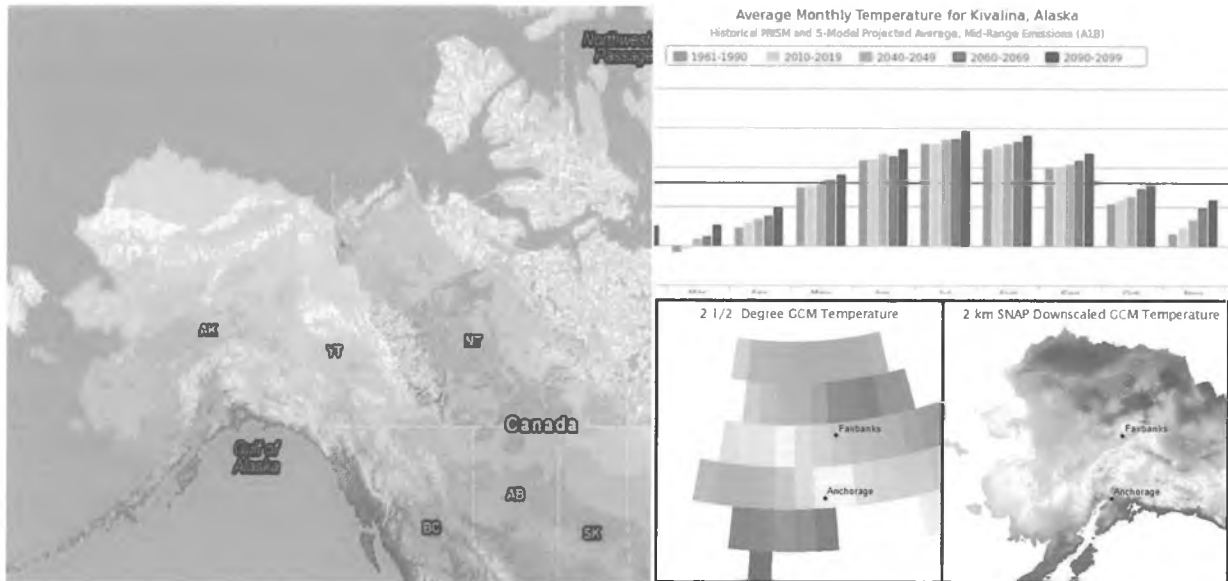
# SwathViewer



# Explore.



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## NIC licenses proprietary data

First license was to

URS for monthly precipitation and temperature data

## NIC

### Economic Development for Fish Processing

After years of development and no private sector licensee, the pinbone removal technology has been licensed to Freeman Bell Machine Shop in Juneau and several prototypes have been transferred to end users.





- Promoting opportunities to reduce cost at the university via “intra-preneurship”

Cleanliness is important. We appreciate feedback.

If this restroom needs attention, Scan here to send a message.

UAF Facilities Services

474-7000

ALASKA

- Licensing this technology



## Transferring Technology

### Recent Assignments into NIC

- Timesheet tracking software
- Signal Processing Software
- Change Detection and Appraisal Software
- Aerosol dispersion tool
- State Filter, Tracker, Localization
- Volcanic ash tracking patent

# UAF Structure for Commercializing Technology



Researchers innovate

OIPC protects IP



NIC licenses IP  
(Separate 501c3)



NTV builds startups  
(Separate C-Corp)



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**NTV**

## Accelerating Startups in the Far North

Nanook Tech Ventures (NTV) is the nation's northernmost startup accelerator program.

A stylized map of Alaska is shown on the right side of the graphic, with white lines indicating state boundaries and major cities.

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



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# Nanook Tech Ventures Board Members



**Scott Bell**  
President  
UAF Director of  
Facilities Services



**Adam Krynicki**  
Vice-President  
OIPC Business  
Development  
Director



**Randy Weaver**  
Secretary  
CFO Denali State Bank



**Michelle Rizk**  
Treasurer  
UA Associate VP of  
Budget



**Doug Johnson**  
Board Member  
Executive VP of  
Professional Growth  
Systems



**Bill S. Pierre**  
Board Member  
Private Investor



**Gloria O'Neill**  
Board Member  
UA Board of Regents Member,  
President & CEO of Cook Inlet  
Tribal Council



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 **V-ADAPT, INC.**  
Volcanic Ash Detection, Avoidance, and Preparedness for Transportation

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**Tools to assess transportation safety and eruption scenarios.**

Volcanic ash poses a significant risk to global & regional commerce. V-ADAPT, Inc. has developed web-based software tools and proprietary methods to help the airline, shipping, and insurance industries manage the risks associated with volcanic ash.




**First startup for NTV**  
[www.vadapt.net](http://www.vadapt.net)





NTV takes inventors from a research concept...



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Fairbanks  
**HACKATHON**

...to a prototype...





...to starting an Alaskan business based on their research and inventions.



There are several companies in the innovation pipeline. Several are launching startups to build new technology under SBIR and STTR grants right here in Alaska.





Faculty have moved to Fairbanks due to the unique start up opportunities provided by OIPC/NIC/NTV.



One inventor and faculty member is partnering with ArcticBio, an Alaskan startup, to build and test a new cell sampling method.



# Investment and Fund Management



## Summary of Success

- UAF OIPC
  - over 130 invention disclosures in the past 2.5 years
- NIC
  - Licensed more than 37 pieces of technology
  - 36 of which are to companies doing business in Alaska
- NTV
  - Created two startups that are licensing technology
  - Four upcoming startups working on technology under SBIR or STTR grants

# Transforming Culture

OIPC/NIC/NTV provides new opportunities for:

- Inventors to commercialize their technology
- Existing companies to license and sell new technology
- Inventors, students, alumni, or other business people build small businesses
- Investors to fund startups here in Alaska
- Inventors to utilize new monetary sources to develop even more inventions in Alaska
  - SBIRS, STTRS, GOALI, I-CORPS, Seed money

## Economic Impact

- Companies get access to better technology
  - Their businesses become more efficient
- Consumers get better, low cost products
- The best talent moves to/stays in Alaska
- Keep money in our state
  - Alaskan investors can invest in Alaskan businesses
- Create high-tech, competitive jobs in Alaska
  - Eight have stepped into private business with conflict plans

# We are Alaska's Innovation Pipeline

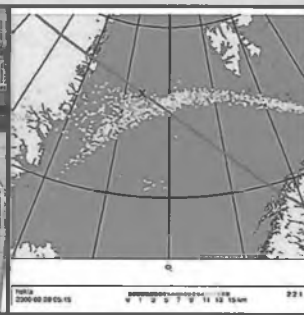


Solve real  
problems



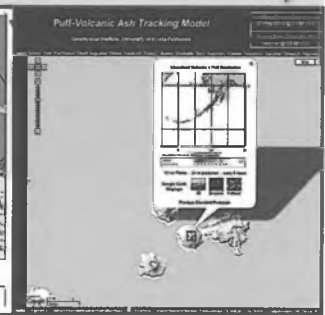
Protect  
intellectual  
property

OIPC



License  
technology

NIC



Create  
startups

NTV



*since 1917*



## THANK YOU

Office of Intellectual Property and Commercialization

P.O. Box 757265

Fairbanks, AK 99775-7265

907-474-2605

[www.uaf.edu/oipc](http://www.uaf.edu/oipc)



**Research and the  
Graduate School**  
UNIVERSITY of ALASKA ANCHORAGE

**Dr. Helena S. Wisniewski**

*Vice Provost for Research and Graduate Studies*

*Professor, College of Business and Public Policy*

*President of Seawolf Holdings, L.L.C.*

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4500 Diplomacy Dr

*Mailing Address*

3211 Providence Drive  
Anchorage, AK 99508-4614



# CFT SOLUTIONS

## Product Description

CFT Solutions provides an innovative and cost-effective approach to revolutionizing snow removal and deicing using carbon fiber tapes. Efficient heating by the carbon fiber tapes embedded under pavement keeps the surface free of snow and ice.

## Advantages of CFT

- **Easy installation at lower costs** than other systems. Complete installation costs \$12 per square foot (40% the cost of a hydronic system).
- **Significantly less expensive** (50% less) to operate than other systems (only \$0.02/ft<sup>2</sup>/day during the heaviest snow fall winter in Anchorage based on an area of 800 ft<sup>2</sup>).
- **Self-monitoring, and remotely managed** - sensors below the pavement control the on/off power supply circuit of the CFT heating panels based on the surface temperature or ice detection.
- **Environmental friendly** - can be powered by renewable energy sources.
- **Durable** - carbon fiber tapes have high strength and long-term stability.
- **Versatile** - easily customized.
- **Safe** - Operates with only 24V AC.
- **Alaska tested** - successfully tested in Anchorage during the winter of 2011-12, which had a record snowfall for the area.



Picture shows CFT keeping a walkway free of snow and ice.



Pictures show easy installation of the technology.

## CFT Technology

(Patent Pending: Patent Filing #14/024,152)

CFT's patent-pending innovation embeds carbon fiber tapes under asphalt or concrete pavement to heat the surface. Carbon fiber materials including regular carbon fiber and carbon nanofibers exhibit excellent strength and electrical properties, offering great potential for deicing applications. Taking advantage of the strength and low electrical resistivity, a plain, woven 3"-wide carbon fiber tape is assembled into panels for anti-icing and preventing snow accumulation. Panel sizes usually range from 6'x4' to 10'x10'. An electrode is connected to the carbon fiber tape with electrically conductive epoxy. To increase the system safety, the heating panels are coated with a thin layer of thermally conductive, electrically isolative epoxy to insulate it from the concrete or asphalt surface. Transformers connected to the electrodes charge the heating panels with a low 24V AC for heat generation. The temperature of the heating panel does not exceed 30oC, and the surface temperature does not exceed 10oC. To provide for self-monitoring, sensors record the inside and surface temperature variations of the pavement.

## Markets and Applications

**CFT satisfies** the need for environmentally friendly, durable, cost-effective, easy-to-install and maintain deicing technology for municipalities, departments of transportation, construction companies, private homes and corporations.

### Applications include:

- High pedestrian traffic areas.
- High usage road intersections.
- Bridges.
- Driveways and walkways.
- Roofs.

## About CFT Solutions

CFT Solutions, LLC is a Seawolf Holdings Company and was legally formed as an Alaskan company. CFT Solutions was created in May 2013 by UAA Vice Provost for Research and Graduate Studies Dr. Helena S. Wisniewski and inventor Zhaohui “Joey” Yang, a UAA civil engineering professor.

The idea for CFT Solutions began when Dr. Yang met Professor Gangbing Song from University of Houston. Dr. Song was experimenting with commercially available flexible carbon fiber to heat surfaces in his lab. Dr. Yang, knowing how dangerous a slick sidewalk was in winter, decided to test the material on walkways in the challenging Alaskan winter. With a grant from Alaska University Transportation Center, the idea that led to CFT Solutions was born.

- **Business model:** assemble customized systems for a particular use and sell directly to customers and through distributors. Provide panel sizes of 6’x4’ to 10’x10’; sizes can be customized to meet customer needs.

The business infrastructure for the commercialization of faculty and student research resides in the Office of Research and Graduate Studies under the oversight of the Vice Provost. This infrastructure includes Seawolf Holdings and Seawolf Venture Fund, which provides seed money for start-ups and has a world class Board of Directors consisting of CEOs, venture firm partners and entrepreneurs. Seawolf Venture Fund provides early stage investment in start-ups and is managed by a seasoned team of investment professionals.

## Management Team

**To achieve its mission, CFT Solutions is assembling a team of experienced senior executives, leaders in technology industries, and entrepreneurs.**

**Dr. Joey Yang is the co-founder of CFT Solutions, LLC, and the technology inventor.** Dr. Yang joined UAA as an Assistant Professor in May 2003. He is currently Professor of Civil Engineering, Associate Director of Alaska University Transportation Center, and Director for Geotechnical and Frozen Ground Engineering Research Laboratory. Dr. Yang’s expertise is in geotechnical and earthquake engineering, and he has maintained an active research program with particular interests in cold regions-related issues since he joined UAA in 2003. He has published more than 50 peer-reviewed papers, including 20 journal articles. Dr. Yang has received research funding in geotechnical/earthquake engineering and cold regions-related research from NSF EPSCoR, U.S. Geological Survey, U.S. Dept. of Interior, U.S. Dept of Transportation via Alaska University Transportation Center, U.S. Dept. of Energy through Alaska Energy Authority, and State of Alaska Department of Transportation. He received his Ph.D. in Civil and Environmental Engineering from the University of California, Davis and his B.S. in Hydraulic Engineering from Chengdu University of Science and Technology.

**Dr. Helena S. Wisniewski is the Vice Provost for University Research and Graduate Studies at the University of Alaska Anchorage. She is also President of Seawolf Holdings, LLC** a wholly owned subsidiary of UAA that is part of the commercialization infrastructure she created, which includes Seawolf Venture Fund. She is an accomplished senior executive with a breadth of experience in public and private companies, academia, and the federal government, and a technological entrepreneur who has successfully launched ten start-up companies, raised investment, and sold three. She served as Vice President for University Research at Stevens Institute of Technology prior to UAA. Prior to Stevens, she was CEO/ Chairman of Aurora Biometrics, a company that she founded, built the business, and sold. She served as Vice President of the Titan Corporation; a senior executive at the Lockheed Corporation; founded the first mathematics program at Defense Advanced Research Projects Agency (DARPA), and previously served at the CIA. She served on public and private boards of directors, including Greatbatch Inc., (GB:NYSE) and its Audit and Technology Committees, and in 2007, the Secretary of the Navy appointed her to the Naval Research Advisory Committee. Dr. Wisniewski currently serves on the Life Sciences Advisory Board of Landmark Ventures. She earned a PhD in mathematics from the Graduate Center of CUNY and has received awards for outstanding leadership, entrepreneurship, and significant scientific contributions including the 2002 Women in Technology Leadership Award.

**Investment Strategy:** Initial investment Seawolf Venture Fund; seeking additional \$500K.

**For additional information contact:** Dr. Wisniewski – hswisniewski@uaa.alaska.edu or Dr. Yang - zyang2@uaa.alaska.edu.



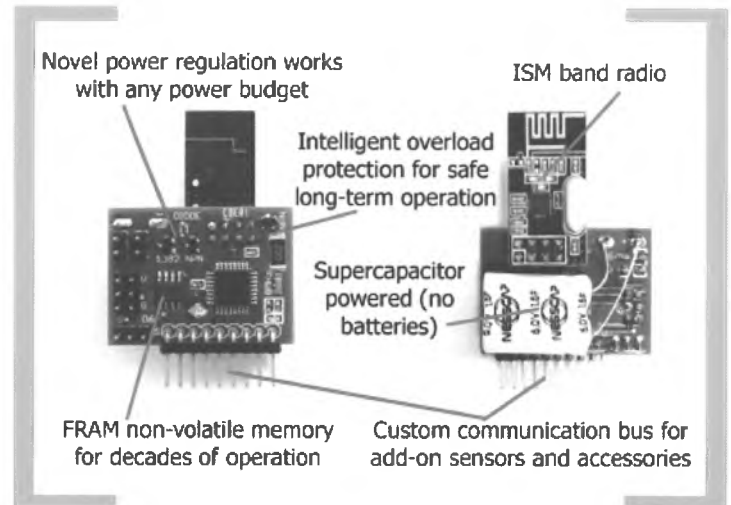
## Product Description

Zensor™, LLC created a new generation of wireless sensors yielding an order of magnitude improvement for use in remote monitoring, asset management, surveillance and security. The Zensor™ ultra long lifespan wireless sensor and its distributed network require no external source of power with performance options that are nearly unlimited.

**Advantages** of the Zensor™ sensor over other sensors presently on the market include: no batteries, in contrast to short life batteries of other sensors; collection of wide ranging data on a distributed network at a very low cost - as much as one-thirtieth the price of other sensors; and multiple capabilities, in contrast to limited capabilities of others sensors.

## Capabilities

- **No batteries** required—solar energy coupled with a new ultra-capacitor.
- Effective with a **small power source**.
- **Long lasting:** 50+year lifespan.
- **Distributed Wireless Networked** system for data receipt, transmission and storage.
- **Requires just one sensor to interrogate** information about every device in the network. Each sensor collects data from all other sensors.
- **Maintenance free.**
- **Low Cost**—Less than \$40 per sensor – sold in kits of 25 for under \$1,000.
- **Current sensors collect and transmit data on:** humidity, light intensity, temperature, color, sound, thermal images, vibrations, and the tilt of a stationary object. Additional capabilities can be added, including GPS and gas sensing (CO<sub>2</sub>, CO, O<sub>2</sub>, CH<sub>4</sub>, C<sub>3</sub>H<sub>8</sub>).
- Currently **testing in arctic** to ensure reliability even under extreme environmental conditions.



## Technology

(Patent Pending #61/645,356)

The sensors have a 50- to 100-meter range and collect 200,000 data packets a day. The invention consists of a sensor network node which incorporates non-volatile memory (FRAM) capable of a large number of rewrites and long data retention times, a wireless transceiver, a solar panel, a capacitive energy harvesting circuit, a controller, and an analog to digital converter.

## About Zensor™

Zensor™, LLC, a Seawolf Holdings company, was formed in February 2013 by the Vice Provost for Research and Graduate Studies at UAA, Dr. Helena Wisniewski, with the faculty inventor, Dr. John Lund, Professor of Engineering. The Zensor™ *mission* is to provide long-lasting, low cost, maintenance-free sensors in a wireless distributed network with multiple performance options for remote monitoring, asset management, security and surveillance. *The idea came from* Dr. Lund's observation of remote monitoring needs for the maintenance and management of assets in the harsh arctic environment. *The business model* is to manufacture the sensors and sell them direct to customers and through distributors. Services will also be provided for customized applications.

UAA's Office of Research and Graduate Studies has an agile business infrastructure for commercialization of faculty and student research. This infrastructure includes Seawolf Holdings and Seawolf Venture Fund, which provides seed money for startups.

## Markets and Applications

The global wireless sensor devices market is expected to increase at a 43.1% annual growth rate (CAGR) to reach an estimated \$4.7 billion by 2016, according to market research firms such as BCC Research. The markets include: industrial installations, residential automation and energy management, ecology and agriculture, defense and surveillance. For example, usage in industrial control systems such as supervisory control and data acquisition (SCADA) shows these devices can effectively meet the needs of industrial applications – the largest growing market.

### **Zensor™ meets market needs.**

- **Industrial installations:** early warnings and preventive data collection for roadway infrastructures and culverts (flooding, changes in surface levels); SCADA for pipelines, pumps transformers, remote monitoring of bridges, oil rigs and other structures; temperature monitoring in shipping and storage containers.
- **Surveillance and security:** border activity sensors placed along the border detect vibrations that indicate movement of persons, or digging of tunnels, or on the water, early warning of submarine and surface vessels.
- **Climate Change and Ecology:** ideal for remote sites over large expanses of difficult-to-reach geographic areas. For example, the sensors can be dropped from UAVs to cover the landscape and provide reports on environmental changes such as ice flow or melt, and climate monitoring, or used creatively to provide data collection from animal herds.

## Management Team

**To achieve its mission, Zensor™ is assembling a team of experienced senior executives, leaders in technology industries and entrepreneurs.**

**Dr. John Lund is the founder of Zensor™, LLC, and the technology inventor.** He is a professor of Electrical Engineering at the University of Alaska Anchorage and received his PhD in Electrical Engineering from the University of Washington. Dr. Lund's research and development experience includes the development of a microfluidic malaria detection tool, a fully automated molecular traversal and analysis instrument for characterizing DNA molecules, and a method for measuring metallized molecules. Professor Lund specializes in nanoscale fabrication and characterization, including the development of nanoscale biosensors and break junctions. His current research efforts focus on developing novel sensors and sensor platforms to allow measurement and data collection where such systems were previously inaccessible. Professor Lund recently developed a patent pending instrumented mouthguard for high-speed data collection to characterize head impact events. He is also actively researching low-power sensor designs to provide additional utility for a long lifespan battery-free wireless sensor platform he developed.

**Dr. Helena S. Wisniewski is Vice Provost for Research and Graduate Studies and Dean of the Graduate School at the University of Alaska Anchorage and President of Seawolf Holdings, LLC,** a wholly owned subsidiary of UAA that is part of the commercialization infrastructure she created and includes Seawolf Venture Fund. Dr. Wisniewski is an accomplished senior executive with a breadth of experience in public and private companies, academia, and the federal government and a technological entrepreneur who has successfully launched ten startup companies, raised investments, and sold three. Prior to UAA, she served as Vice President for University Research at Stevens Institute of Technology. She served as CEO/ Chairman of Aurora Biometrics, a company that she founded, built the business, and sold. She held the positions of Vice President of the Titan Corporation; a senior executive at the Lockheed Corporation; founded the first mathematics program at Defense Advanced Research Projects Agency (DARPA); and served at the CIA. Dr. Wisniewski has served on public and private boards of companies, including Director of Greatbatch Inc., (NYSE:GB) and on its Audit and Technology Committees and the Life Sciences Advisory Board of Landmark Ventures. In 2007, the Secretary of the Navy appointed her to the Naval Research Advisory Committee. She received a PhD in mathematics from the Graduate Center of CUNY and is the recipient of awards for outstanding leadership, entrepreneurship, and significant scientific contributions including the 2002 Women in Technology Leadership Award.

**Investment Strategy:** Initial investment Seawolf Venture Fund; seeking additional \$1M.

**For additional information contact:** Dr. Wisniewski – [hswisniewski@uaa.alaska.edu](mailto:hswisniewski@uaa.alaska.edu) or Dr. Lund – [jalund@uaa.alaska.edu](mailto:jalund@uaa.alaska.edu).



# UAA's Smart Instrumented Mouthguard (SIM)

Patent Pending 61/747,411.

## Product Summary

Traumatic Head Injuries are a foremost concern in athletes and the military. Research suggests that even blows that are not severe enough to cause unconsciousness can be harmful when their effects are cumulatively considered.

In response to these concerns, UAA engineers have created an innovative smart instrumented mouthguard (SIM) with custom wireless capabilities to measure precisely and in real-time the motion of the skull from head impact in sports or accidents, and the effects of such impacts. This new generation of mouth-guard yields a significant improvement in accuracy for use in diagnosing and treating head injury.

## The SIM Advantage

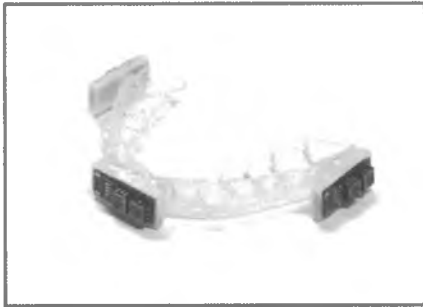
Real-time medical monitoring of sports players is now possible from the sideline, thus preventing re-injury from the failure to remove injured players from the field. SIM sensors fully identify the movement of the skull by collecting data in six dimensions, necessary to accurately measure linear and angular acceleration. Angular accelerations (changes in rotational velocity of the head) can have an enormous impact on the nature of brain injury, and are often the most significant component of impacts resulting in substantial trauma and/or loss of consciousness.

Its rugged construction also makes the smart mouthguard suitable for the military. Soldiers injured on the battlefield, by roadside bombs, or in other explosions will have the exact conditions of their head trauma available for medics and doctors in field hospitals.

## SIM Capabilities

- Accurate measurement of skull motion resulting from an impact to determine brain injury.
- The SIM logs acceleration data and provides a detailed record before, during, and after the impact event.
- Impact events from the SIM are transmitted wirelessly in real time to a central server.
- Provides immediate determination of the severity of the impact.
- Additional logging and post-processing of data can be performed.
- Batteries, controller and wireless transmission electronics can be mounted on the mouthguard or be located on a helmet or other nearby fixture.
- Sensor responses capture sudden and jarring skull movements with appropriate detail for analysis.

Picture 1 that follows is of a pre-molded development prototype to illustrate the orthogonal pairs of high-speed accelerometers that capture spatially-separated linear accelerations which can be used to determine both the linear and angular movements of the head. Picture 2 was taken during lab testing at UAA using a soccer ball.



Picture 1



Picture 2

### **SIM Technology**

In contrast to other products presently on the market, SIM provides:

- Accurate measurements due to a rigid attachment to the upper jaw, which is the ideal non-invasive mechanical connection to the skull. This is in contrast to earpieces and attachments to the lower jaw that are limited in ability to identify skull acceleration. In addition, sensors affixed to helmets provide almost no ability to indicate the motion of the skull/brain as the purpose of a helmet is to isolate the brain from the impact event.
- Six high-speed high-g accelerometers that capture linear and angular motion in all six axes. This allows the SIM to accurately measure all six orientations of linear and angular acceleration, which is necessary to fully identify the movement of the skull. Linear and angular accelerations sensors that are well below historical thresholds (75g) are still serious health concerns.
- A frequency response and measurement speed sufficient to capture all reasonable impact events. SIM angular accelerations provide sufficient detail in time which can be difficult to achieve with other existing micro-electromechanical devices. It should be noted that sensor responses and sampling less than 2 kHz are insufficient to capture sudden and jarring skull movements with appropriate detail for analysis.
- The ability to be incorporated into existing mouthguards for an additional cost of less than \$500.00, or an entire mouthguard can be provided.

#### **For additional information contact:**

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