

# SCIENCE AND TECHNOLOGY



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## NAVAIR Science and Technology Newsletter

August 2011

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NAWCWD nurtures an innovative culture through the China Lake High Tech Consortium.

NAVAIR Science and Technology (S&T) Newsletters are published by the Technical Communication Office (4L6200D) to provide unclassified technical information that pertains to chemistry, life sciences, physics, and technical communication. This newsletter also intends to inform the NAWCWD S&T community about updates, professional development opportunities, and technology highlights.

The contents are not necessarily the official views of or are endorsed by the U.S. Government, the Department of Defense, or the United States Navy.

Please direct article submissions and subscription requests to

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**“We are committed to improving the transfer of S&T into Warfighting capabilities.”**

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## **WEB ACCESS**

All issues of the NAVAIR Science and Technology Newsletter are accessible online for Navy Marine Corps Intranet (NMCI) users at <https://mynavair.navair.navy.mil/scitech>. The newsletter is also available to the public at [www.go.usa.gov/47x](http://www.go.usa.gov/47x).

To subscribe or submit ideas call the Managing Editor at 760.939.8729.

# EMPLOYEE NEWS

## WELCOME ABOARD



**Rebecca Rosenlof**

Rosenlof (4L6200D) is a summer intern with New Directions Technologies, Inc. (NDTI) and is working within the Technical Communication Office. A Ridgecrest native, she will attend Brigham Young University, Idaho, in the fall with a major in English and an emphasis in professional writing.

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**Emma Austin**

Austin (4L6200D) is a Student Temporary Employment Program (STEP) participant currently working in the Technical Communication Office. She was raised in Ridgecrest and will pursue a double major in theater and English at the University of California, Irvine, in the fall.

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**Cheryl Cyr**

Cyr (4L6100D) recently joined the NAWCWD Scientific and Technical Library as a technical information specialist. Originally from Montana, she holds a bachelor of arts degree in English and a master of library science degree from the University of Arizona, Tuscan. Before coming to China Lake, she worked at the Brown Mackie College library in Tuscan.



**Dr. Joe Tsang**

Tsang (4L4200D) serves as the Polymer Science and Engineering Branch Head. Prior to joining NAWCWD, China Lake, he worked at Hewlett-Packard in the areas of polymer and colloid science and at the Central Research of Dow Chemical Company as a polymer chemist. With more than 20 years of industry experience, he is looking forward to developing collaborative relationships between the Navy and external partners, including with DOD Air Force and Army laboratories, academic researchers, and industrial companies in order to conduct fundamental research and to transition the results into deployment. Tsang is originally from Hong Kong and holds a bachelor of science in chemistry from the University of Illinois, Chicago, and a doctorate in organic chemistry from the University of California, San Diego.

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**Anne Ng**

Ng (4L6100D) is a summer intern at the NAWCWD Scientific and Technical Library. Raised in Hong Kong, she graduated with a master of library and information science degree from San Jose State University in 2011 and holds a bachelor of arts degree in history and Asian studies from the University of California, Berkeley. Among her career experiences are a summer internship at the Pentagon library, where she performed research and contributed to one of the Pentagon's websites.

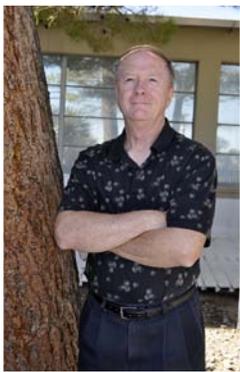


**Suzannah Wilson**

Wilson (4L6100D) is a summer intern with NDTI and is working as a data entry technician within the NAWCWD Scientific and Technical Library. This is her second summer internship with NAWCWD. Wilson, a sophomore at Azusa Pacific University, is pursuing a music

degree and plans to enter medical school upon graduation.

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**Dave Foote**

Foote (4L6200D), a recent addition to the Technical Communication Office, is a technical writer with 25 years of technical writing and editing experience. Prior to arriving at China Lake, he wrote and edited for a private sector semiconductor manufacturing equipping industry, Lockheed

Martin, the Department of Energy, and at Nellis Air Force Base. Foote is originally from Casper, Wyoming.

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**Kenrick King**

King (4L6200D) is a Jacobs Technology employee and recently began supporting the Technical Communication Office in the capacity of writer and editor. A native of Ridgecrest, he earned a bachelor of arts in English at California State University, Chico.



**Margo Allen**

Allen (4L6200D) is a technical writer and editor who recently joined the Technical Communication Office. As a public affairs journeywomen with the Air National Guard, she brings with her 10 years of writing and editing experience. She has also

worked as both the marketing assistant and director at the MWR Marketing Office. Allen was raised in Ridgecrest and earned a BA in communications from Ashford University.

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**Video Projects Team**

The Video Projects Team recently joined the Technical Communication Office Branch (4L6200D) from the Visual Communication Office (753000D). Team members are Steve Banks, Bill Carroll, Bill Kirkpatrick, Mark McCoy, Mark Pahuta, and Tim Tyson.

“This team’s extraordinary talents and expertise will complement those already present in our division,” said Antonella Thompson (4L6000D), head of the Technical Communication and Library Division.

## FAIR WIND AND FOLLOWING SEAS

### Jack Minton

After 43 years of devoted service, Minton (4L6200D) retired 1 June 2011. He served as a technical editor and writer at the NAWCWD Technical Communication Office (TCO), formerly the Technical Information Department (TID), in China Lake, California.

### Pat Backes



After 22 years of federal service, Pat Backes (4L6100D) retired on 30 June 2011.

Backes was born and raised in New Richmond, Wisconsin. Her love of literature and the enjoyment she found in organizing and finding information in print and other forms of media led her to become a physical science and engineering librarian. She earned a master of arts in information resources and library science from the University of Arizona, Tucson and a master of science in administration from California State University, Bakersfield.

Backes began working in the NAWCWD Scientific and Technical Library, China Lake, California, in 1992.

“The most rewarding part of my job [has been] to find or locate information for people that need it for their job, a class, or personal enrichment,” said Backes.

For those just beginning a career as a physical science and engineering librarian, Backes emphasizes “getting as much education as you can by taking classes, attending conferences, and networking with others in the field.”

Backes is looking forward to a variety of retirement activities.

“My retirement plans are to travel, visit with family and friends, get more active in clubs that I already belong to, and join a couple of clubs that I have wanted to join, but could not because I was working,” Backes said.

“I want to read many of the classic books that I did not have time to [read] in the past.”

She will also continue to enjoy two additional favorite hobbies: baking and collecting antiques.

## TECHNICAL LIBRARY STORYTELLING SERIES “HAVE I GOT A STORY FOR YOU!”

NAWCWD Scientific and Technical Library

On 9 June 2011, the Technical Library presented, “Full Scale Target Drones: Realistic Testing for Anti-Air Guided Missiles.” Storytellers included two pilots, who tested and flew the remotely piloted QF-4s as target drones from ground-based cockpits, as well as the three ESDPs who brought a piece of history back to life, transforming those cockpits into simulators to be used as educational tools and public awareness exhibits.

Previous programs in the series are available on DVD for checkout from the library. For more information, call 760.939.3649.

## CHINA LAKE DISTINGUISHED SPEAKERS COLLOQUIUM SERIES



On 29 July 2011, China Lake Distinguished Speakers Colloquium Series was held at NAWCWD, China Lake, CA. Professor Michael Strano (Massachusetts Institute of Technology) presented, “New Concepts in Molecular and Energy Transport Within Carbon Nanotubes: Thermopower Waves and Stochastically Resonant Ion Channels.”

This series is made possible by the training center: partners in education. For more information about the series and inviting speakers call either or 760.939.7719 or 760.939.8650.

## AWARDS

VADM David Architzel presented the Commander’s Award Winners at a ceremony held at Patuxent River, MD on 22 June 2011. Congratulations to all of the recipients.

- 1 Security Operations Team, led by Bill Rabbitt, for the Business Operations Category.
- 2 PMA-261 Logistics Team, led by Robert Leavitt, for the Logistics and Industrial Category.
- 3 Fleet Readiness Center Southeast (FRCSE) Industrial Environmental Program Team, led by Peter Gallant, for the Program Management Category.
- 4 P-3 Team, led by CAPT Aaron Rondeau, for the Quality of Service Category.
- 5 AH-1Z Program Team, led by COL Harry Hewson and Scott Hite, for the RDT&E Category.
- 6 P-3C Aircrew Tactical Team Trainer (PACT3) Integrated Product Team (IPT), led by Jonathan Glass, for the Science and Technology Category.
- 7 This year’s Edward H. Heinemann Award will be presented to the AN/AAR-47A/B(V)2 Missile Warning System Hostile Fire Indication (HFI) Integrated Product Team (IPT), led by Keith Taylor.
- 8 The T. Michael Fish Award winner this year is Mr. Greg W. Kennedy, AIR 4.6.5.
- 9 The Small Business Advocacy Award winner will be presented to the PMA-281 Science & Technology Team.

## WIRED FOR WAR: THE SCIENTIFIC REALITY OF ROBOTS, WAR, AND POLITICS IN THE 21ST CENTURY

By Michelle Campbell  
Contractor for Technical Communication Office  
Research and Intelligence Department



What was once considered science fiction is now a reality in today's battlefield. In the 1940s, nuclear physics was a cutting-edge technological field. Today, the field of robotics is at the forefront of technological development. While the U.S. military employed only a handful of drones in 2003, today the number of drone systems in the U.S. military's inventory exceeds 7,000. Tens of thousands of robots are predicted to be implemented in future warfare. In fact, in 2009, the U.S. Air Force trained more unmanned systems operators than it trained manned fighter plane and manned bomber plane pilots combined.

Robotics is fundamentally reshaping warfare, both in combat zones and on the home front. Dr. Peter Warren Singer, defense strategist and specialist in 21st century warfare, believes that the broader and detrimental implications of a robotics revolution may be poorly understood. The Office of Naval Research (ONR) hosted a teleconference presentation by Dr. Singer on 8 March 2011. After an introduction given by the Naval Research Laboratory's (NRL's) robot Octavia, who is a mobile, dexterous, and social robot designed to communicate naturally with humans, Dr. Singer posed the following questions: How will using robotic technology impact the politics, ethics, economics, and laws that encompass the very nature of war? What does it mean to be sending out more "soldiers" whose hardware actually says "Made in China" on the back of them?

"Dr. Singer acknowledges that technology is good and wonderful, but he also says to not forget all these other [consequences]," said audience member Andrea Phillips (4J2300D), an operations research analyst. "Technology is not a panacea."

"Every so often in history, there are revolutionary technologies that come along that change the rules of the game," said Dr. Singer. "What is important is not [the technology's] capabilities but the questions that they force us to ask, questions about what is possible that we never knew was possible before, questions about what is proper—issues of right and wrong that we didn't have to deal with before."

In his investigation into the impact of robotics on warfare politics, ethics, economics, and laws, Dr. Singer interviewed national and international players in the robotics field, such as robotics scientists, unmanned systems operators, and servicemen and women. Through his interviews, Dr. Singer discovered some notable ripple effects of robotic technology use.

## Politics and Ethics of Robotic Warfare: Redefining War from a Warfighter's Perspective

In the process of unmanned systems, the definition of war is changing. The human relationship to war is being reshaped.

“For the past 5,000 years, war has meant going to a place of such danger that you might never see your family again,” Dr. Singer said. “When you went to war, you were taking a risk that you might never come home again.”



The modern soldier faces a fundamentally different experience of what it means to “go to war” due to the military’s use of remote unmanned systems operators. Dr. Singer shared the words of a modern predator squadron commander who described fighting insurgents in Afghanistan while never leaving his home state: “You are going to war for 12 hours, you are shooting weapons at targets, you are directing kills on enemy combatants, and then you get in the car and drive home. Within 20 minutes you are sitting at the dinner table talking to your kids about their schoolwork.’ ”

An important benefit of remote warfare is that soldiers are not placed in environments where there is a risk of physical harm. However, remote warfare is turning out to be difficult for those involved. Remote warriors have rates of post-traumatic stress disorder and combat stress and fatigue that are as high and in some cases even higher than many Warfighters that are physically deployed in Iraq and Afghanistan.

At the same time, Dr. Singer believes remote warfare can desensitize the participants, which in turn will make it easier for nations to go to war.

It could become “very easy for our military personnel to be more removed from the consequences of warfare,” said Phillips. “As we go more and more mechanized, the easier it is to forget the consequences.”

“The P.W. Singer postulation that ‘robots would make war too easy’ stimulated a lot of thought amongst our UAV Weaponization Study group in 4.10,” said audience member Charlotte Pofeldt (4J0000D). “Remotely deciding if someone is targeted and then going home to family is a lot tougher than it appears.”

Current technologies also enable everything the operator views to be recorded. Numerous combat footage videos, which appear on sites such as YouTube, permit one to see connections between the warfront and the home front that never existed before. This is arguably a good thing, Dr. Singer said. However, the fact that one can watch scenes from a real world battle on an iPhone is turning war into a form of entertainment for some, leading to desensitization.

“Technology enables us to watch war more but actually experience it less. The danger in that is it tricks us into thinking we understand more about war than we actually are able to [as viewers],” said Dr. Singer. “We forget that we are not watching the whole game so to speak, but only a part—the sports highlights version of war.”

One very positive benefit of robotic developments is that more than 400 soldiers who have lost arms and legs due to roadside bombs are able to return to their units due to robotic prosthetics. However, is it ethically acceptable to use robotics to enhance the human body as well as “fix” it? While this might seem to be a far off decision, Dr. Singer cited an example of a British Special Air Service member who had laser eye surgery that allowed him to see 400 meters at night. Unresolved ethical decisions exist in the present.

“We can build products, like robots, before the legal system or naval cultural ethics have decided strategy and policy,” said Pofeldt.

## Economic Influence of Robotic Warfare: International Competition in and the Increasing Availability of Military Robotics

A reality of both technology and war is that there is no such thing as a permanent first mover advantage. While the British were the first to invent and use a tank in World War I, the Germans had reinvented the tank by World War II. Western democracies, particularly the U.S. are currently ahead in robotics technology.

However, there are 44 nations that are building, buying, and using robotics. These nations include China, Pakistan, Iran, and Russia.

With the availability of commercial off-the-shelf and do-it-yourself robotics technology, small groups and individuals are becoming empowered in the robotics field. For example, in 2003, a 77-year-old blind man built a homemade drone and flew it across the Atlantic Ocean from Newfoundland to Ireland. In 2007, the editor-in-chief of *Wired* built his own version of the Raven drone for a thousand dollars.

We must take into consideration where the robotics trend line is headed, Dr. Singer cautioned. What is the impact that easily accessible and affordable robotics technologies will have on terrorism, particularly suicide terrorism?

“In World War II, the German Luftwaffe, or air force, was not able to send planes across the ocean to the U.S.,” Dr. Singer pointed out. “Today, a 77-year-old blind man has the Reach that an entire air force did not have in the 1940s.”



*Robotics International Competition*  
(Source: U.S. Navy)

## Laws of Robotic Warfare: Is the Geneva Convention Applicable?

What law does one turn to if a predator drone strike goes awry? Dr. Singer’s interviews revealed a lack of consensus as to whether the Geneva Convention would be applicable in such a case.

“In about 2009, in South Africa, an automated anti-aircraft cannon had a ‘software glitch’ and killed nine soldiers,” Dr. Singer said. “The main point is not only that it happened, but how do we respond? What system of laws does an investigator turn to for guidance?”

“What is playing out,” he added, “is 21st century technology being applied against 21st century war participants (such as insurgents who deliberately violate the rules of war by surrounding themselves with women and children) and 20th century laws are caught in the middle.”

“Dr. Singer’s presentation was very thought provoking,” said Ron Schultz (476000D), head of the Weapons and Airframe Division. “Here at China Lake, we are very good at engineering—the here and now. But it is also important to consider the bigger picture.”

Dr. Singer’s presentation is based on his book, *Wired for War: The Robotics Revolution and Conflict*. *Wired for War* is considered official reading in organizations such as the National Defense University, the U.S. Navy, the U.S. Air Force, and the Royal Australian Navy. Dr. Singer is a Senior Fellow and the Director of the 21st Century Defense Initiative at the Brookings Institution. His career has included being named by the President to the Joint Forces Command’s Transformation Advisory Group and working for the Balkans Task Force in the U.S. Department of Defense (DOD). He received his PhD in Government from Harvard University and a BA from the Woodrow Wilson Public and International Affairs.

## **INTERNATIONAL TECHNOLOGY COOPERATION OFFICE (ITCO) REPORT EXECUTIVE SUMMARY: NAWCWD CAPABILITIES AND UNITED STATES PACIFIC COMMAND'S SCIENCE AND TECHNOLOGY NEEDS FOR NON-TRADITIONAL SECURITY THREATS**

By Kristin Burke

International Technology Cooperation Office (ITCO)

The United States Pacific Command (USPACOM) has requested science and technology (S&T) tools to help strengthen their influence in their Area of Responsibility (AOR); the operational fields in which PACOM can best build relationships are maritime security and humanitarian aid/disaster relief (HA/DR). Beyond identifying Naval Air Warfare Center Weapons Division (NAWCWD) capabilities which can meet PACOM's S&T requests, the ITCO report will provide an analysis of how PACOM uses S&T in maritime security and HA/DR operations to strengthen international partnerships. With a better understanding of PACOM's needs, NAWCWD can further access the ancillary benefits of its RDAT&E capabilities.

The events on 9/11 were an alarming example of a shift in the global security environment from traditional to non-traditional threats. In the 21st century, non-state actors such as terrorists and pirates use unconventional weapons to strike their targets and recruit more followers. To address these new threats, the Department of Defense (DoD) has developed ways for the Combatant Commands (COCOMs) to win the hearts and minds of foreign communities and enhance information sharing with international partners. Of the six regional COCOMs, PACOM has been the most explicit in embedding their S&T request in the context of needing to develop soft power with international partners.

NAWCWD has in the past met PACOM's S&T needs and has the current capabilities to meet these needs again. NAWCWD's 2010 Strategic Plan has laid the groundwork to further support a full spectrum of security threats, beckoning NAWCWD employees to use

international partnerships and stewardship of natural resources to provide the Warfighter with a decisive advantage. PACOM Warfighters now need the decisive advantage to counter non-traditional security threats (i.e., more joint RDAT&E projects for maritime security and HA/DR operations to facilitate relationship building).

Increased information sharing with international partners is needed for interoperability and strengthened trust in both maritime security and HA/DR operations. NAWCWD's Information Fusion Center (IFC) and Integrated Battle Space Arena (IBAR) can provide multiple services to meet both operational needs: the IFC is working to stream HA/DR data from the PACOM AOR and is developing the skill-sets to leverage other NAWCWD sensor fusion efforts; the IBAR can simulate complete maritime operational scenarios and information sharing exercises to prepare the Warfighters for a maritime security or HA/DR event.

One of PACOM's HA/DR efforts is to help build partner country resilience to natural disasters by jointly developing low cost renewable energy and water filtration technologies. PACOM has also channeled excess energy from overseas bases into local communities. NAWCWD has the capability to evaluate solar photovoltaic and fuel cell energy storage systems for joint RDAT&E projects. Additionally, NAWCWD is in the process of demonstrating an enterprise technology model to couple waste-water purification with biomass production for biofuel and biomaterials research and design (R&D), which could meet water purification needs in the PACOM AOR through joint R&D projects. Taken together, NAWCWD has the capabilities to meet PACOM's needs for non-traditional security threats through joint RDAT&E projects with international partners.

Ms. Kristin Burke is currently a graduate student at the George Washington University, Elliott School of International Affairs, studying for a Master's degree in Asian studies. Requests for the complete ITCO report may be directed to Genesis Smith at [genesis.smith@navy.mil](mailto:genesis.smith@navy.mil).

## August 2011

### — China Lake Distinguished Speakers Colloquium Series

**Date:** 10 August 2011

**Time:** 1400 PST

Professor Derek Dunn-Rankin (University of California, Irvine) presents, “Burning Old Fuels in New Ways and New Fuels in Old Ways.”

**Location:** 1000D Michelson Laboratory (Building 00005), China Lake, CA 93555.

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### — Wired for War: Everything You Wanted to Know About Robotics and War, But Were Afraid to Ask...Afraid to Ask...

**Date:** 16 August 2011

**Time:** 1300-1600 PST

Dr. Peter Warren Singer, author, senior fellow and director of the 21st Century Defense Initiative at the Brookings Institution will be speaking at the McLean Conference Center. All with an interest in robotics, autonomous systems, and the future of modern warfare are urged to attend.

**Location:** McLean Conference Center (Rooms 1112-1116), China Lake, CA 93555.

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### — China Lake Distinguished Speakers Colloquium Series

**Date:** 18 August 2011

**Time:** 1400 PST

Professor Keith Nelson (Massachusetts Institute of Technology) presents, “Real-Time Optical Measurements of Materials Undergoing Permanent Change: Solid-State Chemical Reactions, Phase Transitions, Shock Waves, and High-Field Responses.”

**Location:** 1000D Michelson Laboratory (Building 00005), China Lake, CA 93555.

## INNOVATE TO THRIVE

By Michelle Campbell  
Contractor for Technical Communication Office  
Research and Intelligence Department

“Innovation is the art of what is possible.” These words, spoken by Scott O’Neil, Executive Director of the Naval Air Warfare Center, Weapons Division (NAWCWD), China Lake, reflect the principle on which NAWCWD was founded and that defines NAWCWD’s research today. On 31 May, NAWCWD welcomed guest speaker Robert Brands, author, innovation coach, and a successful entrepreneur who has played an integral role in many significant new product introductions in the commercial market.

“Innovation is the art  
of what is possible.”  
---Scott O’Neil

### How to Create and Sustain Innovation

Innovation is critical to the success of our Warfighter. In today’s rapidly advancing technological society, U.S. adversaries are increasingly able to obtain desired technology quicker than in previous decades. Since innovative product development is the backbone of NAWCWD’s research, it is important to ask, what characteristics do successfully innovative organizations demonstrate?

First, an organization must create an environment that inspires team members. One aspect of such an environment is embracing the belief that risk taking is essential for innovation to truly thrive.

“Innovation is creativity times risk taking,” Brands shared with the filled conference room. “An organization has to be willing to have some failures to be successful and innovative. Failure breeds success. There is no inventor, no entrepreneur, who has come to be successful without failure.”

Andy Corzine (400000D), NAWCWD’s Innovation Team Lead, Deputy Director for Research and Engineering, agrees that taking calculated risks is essential for innovation.

“The risk of missing out on an innovative solution is much worse than the risk of failure,” he said. “If something does not work out, we evaluate the situation and try something else.”

Brands also encouraged NAWCWD to be passionate about successful innovation.

“Inspiration and innovation need a champion,” Brands said, “someone who has a great passion for what they are doing and who can reach other people...A lot of what we consider impossible can be overcome.”

A willingness to take risks and a passion for successful innovation are two of ten imperatives established by Brands for creating and sustaining profitable innovation.

The Robert’s Rules of Innovation™, includes the following imperative:

- 1 Inspiring team members, a process which should ideally be initiated by those in leadership.
- 2 Taking calculated risks.
- 3 Establishing a carefully designed new product development (NPD) process.
- 4 Establishing ownership and responsibility for the different facets of the innovative process (which leads to a passion for success).
- 5 Creating value for a product.
- 6 Maintaining accountability among teammates.
- 7 Training and coaching employees.
- 8 Establishing an effective process for managing the flow of ideas.
- 9 Observing and measuring performance in the NPD process.
- 10 Rewarding and recognizing team members who assist in the profitable growth of a new product or idea.

“I believe that being mindful of the entire collection of [Brands’s] thoughts is important to help foster our culture of innovation,” said Corzine. “It is hard for me to pick just one that is most critical for NAWCWD.”

## **The China Lake High Tech Consortium: Maintaining Innovation at NAWCWD**



One of the ways in which NAWCWD is nurturing an innovative culture is through the China Lake High Tech Consortium (CLHTC).

The CLHTC is “a unique partnership of government, industry, academia, non-profits, and investors working collaboratively to address technology requirements for

both the military and the commercial marketplace,” shared Corzine. “The goal is to be a creative forum for multi-use technology innovation by asking, what else can your technology do?”

Well into its second year, the consortium is currently involved in activities such as the Massachusetts Institute of Technology (MIT) Industrial Liaison Program, non-traditional partnerships and cooperative research,

technology licensing, alternative energy exploration through collaboration, new product development with industry, and multi-use technology symposiums at MIT, Brigham Young University (BYU), and China Lake.

“The value [the Consortium] brings to NAWCWD derives from its networking capabilities, in terms of propagating NAWCWD’s innovations and capabilities, and making us aware of the innovations and capabilities of a wide variety of academic and industrial centers of excellence,” said Dr. Michael Seltzer (4L4000D), head of the Industrial Liaison and Technology Transfer Office and Small Business Innovative Research (SBIR) coordinator.

## **Patent Protection**

Protecting NAWCWD’s innovative intellectual property is crucial. Charlene Haley (K00000D) emphasized in particular the need for patent protection. A new law will soon come into effect under which a patent will be ascribed to the first party to disclose an invention, instead of the party that can prove they were first to invent,” said Haley.

“We need to understand the value of our IP, rethink our business value, and stop giving IP away,” O’Neil stated.

For information on the China Lake High Tech Consortium, call 760.939.0591.



## THE EXPANDING SMARTPHONE APP MARKET PROVIDES USEFUL TOOLS FOR RESEARCHERS AND SCIENTISTS

By Emma Austin  
Technical Communication Office  
Research and Intelligence Department

Since the iPhone hit the market in 2007, smartphones have taken the world by storm. What began as an Apple-dominated market of iAccessories has become an ever-expanding world of customizable devices, from Google's Android to the Window's Phone. The appeal? Smartphones are known for their "apps:" a term used to describe Internet applications that run on smartphones and other mobile devices. Apps can transform a cellular device into a schedule manager, hi-tech calculator, social media outlet, and even a personal library. Many apps are for entertainment purposes; however, some apps are advanced enough to be tools for even the researchers and scientists of NAVAIR.

Here are five of the most useful apps for researchers and scientists:



**Wolfram|Alpha** is a calculator and a scientific search engine all in one. This app will not only give users detailed answers to complex math problems, but it will also answer word-based inquiries, such as what's the fourth

largest country in Asia by GDP and the sky chart for Palo Alto, CA in three days time. Wolfram|Alpha can also compute basic chemical equations, making it a handy tool for chemical scientists.

Current user Electronic Engineer James Walters (Code 47J160D) uses it mostly for its mathematical prowess. He remarked, "It doesn't take the place of having a basic understanding of the math involved, but it what it does do is help eliminate the human error that comes in when you try and solve something."

Although it may not have the answer to every question and comes at a small price (\$1.99), Wolfram|Alpha is an impressive information tool for both iPhone and Android platforms.

<http://products.wolframalpha.com/iphone/>  
<http://products.wolframalpha.com/android/>



**Promega** is a useful reference tool for life scientists. The app includes biomath calculators, as well as video protocols and reference materials covering key topics in molecular and cellular biology. There is nothing lacking in the realm of information: the explanations of each topic are thorough, including an assortment of pictures and graphs to illustrate the concepts. In addition, the calculators include a variety of conversion units, making it convenient for a scientist on the go. Much of the app can be accessed offline, and the information is organized well. However, using the app without 3G or Wi-Fi connection can result in some unresponsive links. Overall, a helpful resource for those who need scientific information more thorough and reliable than Wikipedia can offer.

<http://itunes.apple.com/us/app/promega/id307546949?mt=8>

<http://www.appbrain.com/app/promega/com.promega>



**AstridTask** is a simple to-do list that can help manage a schedule. It can be used as a widget for direct viewing, or be hidden and accessed whenever the user prefers to see it. All tasks have the option of having an exact due-date and time, assigned

levels of importance, and the app itself can be used as a timer to see how long it takes to do a particular task. This can be useful for smartphone users looking to better manage their time. The simplicity of the app is what gives it its charm: tasks can be added directly to the widget, with or without deadlines or additional information. The app is for Android users only, who can find it free on the Android Market.

<http://astrid.com/>



**Evernote** is a technology that allows users to record notes, pictures, audio, and save web clippings onto more than one device, including a mobile phone, personal computer, or a tablet. Set up is simple: users install Evernote onto

whichever system they need to access notes from, and Evernote will sync wherever installed. This means that an audio note recorded with a mobile phone can be later heard from a computer, and that a web-clipping made on

a tablet can be later seen on a mobile device. The app will automatically process, index, and make all added notes searchable—even handwritten messages.

A new user to Evernote, Technical Writer/Editor Moya Lyttle (Code 4L6200D), said, “I like that I can have one account and sync to multiple devices. It’s just really easy and useful for making notes.”

Another feature of the Evernote computer application is the ability to easily encrypt information, although there is no way to de-encrypt the data if the user loses their password. Unfortunately, a user must upgrade to the Premium edition in order to upload complete documents. Available on all devices and computers, Evernote is a handy way to organize thoughts.

<http://www.evernote.com/>



**The PubMed** apps for Android and iPhone are essentially an extension of the PubMed.gov website, a site comprising over 20 million citations for life science journals, biomedical literature from MEDLINE, and online books. The apps provide users with an easily navigable search of published articles, readable abstracts, an option to save citations for later viewing, a simple way to email citations to interested parties, and access to full articles through an internet browser. Search results can be grouped not only by author, journal title, article title, and key words, but also in reference to humans, animals, or gender. PubMed is a more comprehensive researching tool than Google or Wikipedia, and because it is sponsored by the U.S. National Library of Medicine and National Institutes of Health, provides more trustworthy results than either of these commonly-used counterparts.

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NAWCWD TS 11-143