National Aeronautics and Space Administration

goddard tech transfer news

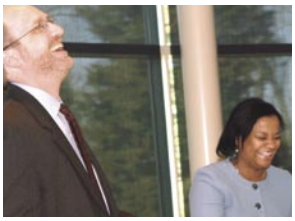
volume 4, number 2 | SUMMER 2006

on the cover:

Materials Engineering Branch researcher **Michael Beamesderfer** has developed an innovative sensor to detect the thickness of thin-film parylene depositions accurately, precisely, and in real time. Goddard's Office of Technology Transfer is working to move this technology into advanced applications of thin-film parylene. Read more about this and other tech transfer efforts inside.

in this issue:

photo credit: Chris Gunn



Tech Transfer's 2006 NTR Program

photos by Debora McCallum

More than 100 Goddard researchers gathered at the Newton White Mansion in Mitchellville, Md., on April 6th to celebrate their achievements in the field of technology transfer. Hosted by OTT, the NTR Program is held to recognize the commitment and cooperation of Goddard's scientific and technical staff in pursuing NASA's technology transfer goals. One of the highlights of this year's program was Dean Hering, who gave a lively presentation on the concept of "innovating on purpose." This approach to managing innovation is the focus of OVO, a division of Virginia-based NetCentrics where Hering is chief innovator. In addition to his presentation, Hering served as moderator during the various award and other presentations, as described below.

A Tech Transfer Success Story

This year's NTR Program provided Goddard innovators with the opportunity to hear about a recent technology transfer success story: Micro Pulse Lidar (MPL), which was licensed to Sigma Space Corporation (http://www.sigmaspace.com) in 2005.

MPL relates to lidar (or laser radar), which is used in atmospheric monitoring. Early ground-based lidar systems had several limitations. They were neither eye-safe nor reliable, and they were large, complex, and costly. In the early 1990s, a team of researchers led by **James Spinhirne** (Code 613.1) created MPL, an instrument that offers simple, remote, autonomous, reliable, accurate operation housed in an eye-safe, small, inexpensive, low-power package.

Over the years, MPL was used by NASA as well as outside organizations, particularly as part of the MPL Network (http://mplnet.gsfc.nasa.gov). Established in 2000 and funded by NASA, the MPL Network collects data from many MPL devices across the globe and publishes the data online, giving scientists free access to atmospheric data not previously available. These data have been used in studies of Saharan and Asian dust, pollution aerosols, smoke from biomass burning, and blowing snow and cloud heights over Antarctica.

Kerley Award

Named in honor of the late James Kerley, a Goddard researcher who was a prolific inventor (see pages 6–7) as well as a champion of technology transfer for the good of humanity, the Kerley Award for 2006 was given to **James Tilton** (Code 606.3) for his efforts to transfer his Hierarchical Segmentation (HSEG) software. Originally developed for remote sensing applications, HSEG provides a new approach to image analysis. Rather than analyzing images on a pixel-by-pixel basis, this software automatically organizes image pixels into regions.

"Looking at the regions instead of the individual pixels allows the user to isolate specific features that otherwise are impossible to distinguish," explained Goddard's deputy director **Michael Ryschkewitsch** (Code 100) at the April event. "For example, in a satellite image, the software can indicate different types of vegetation, distinguishing a golf course from a park from woods."

The HSEG software also is useful in a wide range of non-NASA applications, most notably in medical imaging where it has been incorporated into a commercial product. Developed by Bartron Medical Imaging (http://www.bartron.ws), Med-Seg™ uses the HSEG software to assist in the diagnosis and management of diseases that are imaged using digital X-rays, mammograms, ultrasounds, MRI images, and CAT scans.

Patent Awards

Also during the NTR Program, awards for Goddard innovators who had a technology patented in the past year were given to the following: **Michael Dipirro** (Code 552), **Norden Huang** (Code 614.2), **John Kolasinski** (Code 565), **James Lyons** (former Goddard employee), **Susan Semancik** (Code 708), **Peter Shirron** (Code 552), and Dr. Tilton. (For more information on awards, see page 11.)

Goddard Tech Transfer News
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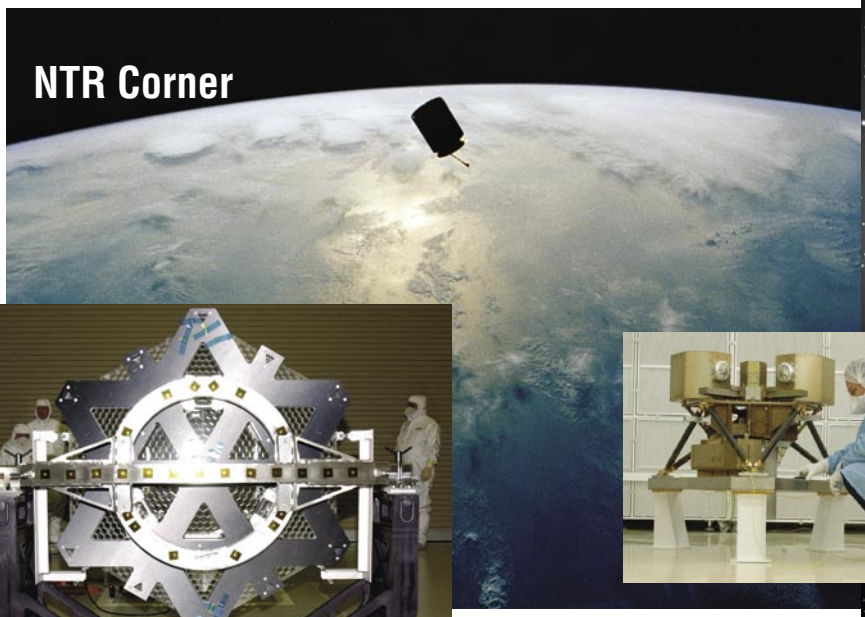
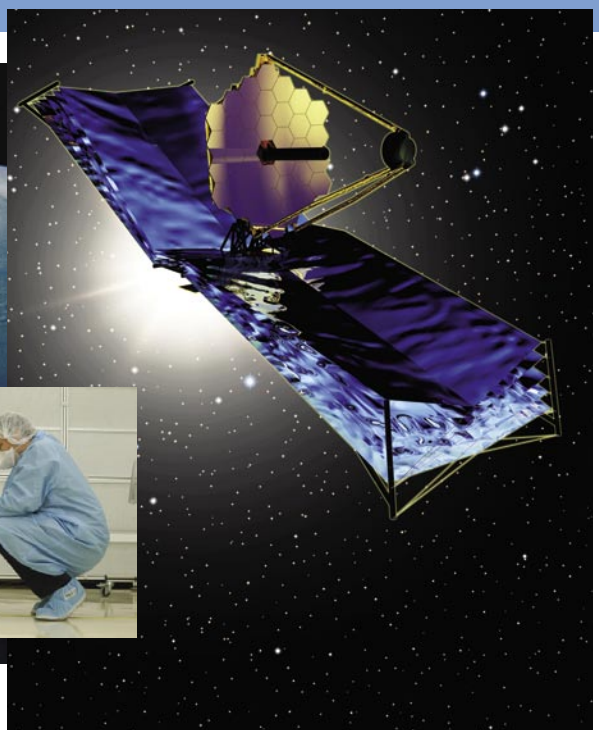
Goddard Tech Transfer News is the quarterly magazine of the Office of Technology Transfer (Code 504) at NASA Goddard Space Flight Center in Greenbelt, Maryland. This magazine seeks to inform and educate civil servant and contractor personnel at Goddard about actively participating in achieving NASA's technology transfer goals:

- Filing required New Technology Reports on eNTRe (http://entre.nasa.gov)
- Pursuing partnerships to accelerate R&D
- Finding new applications for space-program technology
- Identifying innovative funding sources
- Communicating partnership opportunities via conferences, workshops, papers, presentations, and other outreach efforts
- Seeking recognition by applying for technology-related awards

Please send suggestions or feedback about *Goddard Tech Transfer News* to the editor.

NTR Corner





photos courtesy of the JWST web site (http://www.jwst.nasa.gov)

Editor's note: This column features technologies that have been reported to Goddard's Office of Technology Transfer. For more information about reporting your technologies, go to http://entre.nasa.gov or contact the OTT (6-5810; techtransfer@gsfc.nasa.gov).

Technology Title: Nanophase Dispersion–Strengthened Invar 36

Inventor: Timothy Stephenson (Code 541)

Case No.: GSC-15158-1

What it is: A technique for reinforcing Invar 36, which is a material with a low coefficient of thermal expansion (CTE) often used in satellite structures.

What makes it better: Although Invar 36 offers a low CTE, it also has low strength, low specific stiffness, and high density. These limitations were highlighted most recently in trade studies concerning Invar 36's use in the Integrated Science Instrument Module (ISIM) and the back plane for the James Webb Space Telescope. The technique proposed in this NTR forms a lower density, higher strength metal-matrix composite with higher specific stiffness while maintaining Invar 36's low CTE.

How it might be used: The material might be useful to any aerospace company that builds precision instruments—such as optical benches, optical metering components, and support structures—requiring the use of structural materials with low CTE and high dimensional stability.

Tech transfer status: This innovation is in the "idea phase" and has not yet been tested. Therefore, OTT is working to develop a two-way nondisclosure agreement (NDA) with a commercial company that has the capabilities to implement the technique. The two-way NDA, which would be the first such agreement for Goddard, would enable the company and the inventor to work together to test the concept without revealing each others' confidential information.

Q&A

Q: When should I file an NTR?

A: The earlier the better:

- An NTR should be submitted as soon as you recognize you have a new invention. This may occur in the middle of a project while R&D is still ongoing. Or it may be at the end during normal project reporting. The process of writing programmatic and mission progress reports also may assist you in recognizing and describing a new innovation.
- The earlier your invention is reported to the Office of Technology Transfer, the more effectively and efficiently OTT can help protect NASA's interest in the technology as well as seek external partners.
- Even if your invention is "just an idea," filing the NTR right away enables OTT to provide guidance and assistance. (See the "NTR Corner" article at left.)
- Most importantly, you should submit the NTR ***before*** making any public disclosure of your innovation. Premature disclosure could result in NASA losing its rights to the invention, which jeopardizes partnership opportunities and eliminates the possibility of royalty payments to you and Goddard.

Submit your NTRs online at http://entre.nasa.gov

Michael A. Beames

What is your field of research at Goddard?

I work in several areas, including confocal microscopy, advanced applications of thin-film parylene, and tin-whisker population assessment via white light confocal microscopy. One of my most exciting projects right now is the room-temperature and cryogenic characterization of the microshutters used in the near-infrared spectrograph (NIRSpec) instrument for the James Webb Space Telescope (JWST).

What is the NIRSpec?

NIRSpec is one of the four instruments that make up heart of JWST—that is, the Integrated Science Instrument Module. Operating at medium- and low-resolution levels over a range of wavelengths, NIRSpec will obtain spectra of more than 100 objects simultaneously. This innovative aperture control is provided by a 171-by-365 array of microscopic—about 200 µm wide—shutters that open and close individually to view or block portions of the sky.

The challenge at this point is knowing how to design the microshutters to perform properly in space. The behavior of thin films and the characterization of the shape of the shutters under the extreme and varying temperature ranges and other conditions of space is a virtually untapped area of research.

How do you characterize the shape of the microshutters?

We have developed a cryogenic testbed utilizing our white light confocal microscopy capabilities, a liquid helium–compatible microscope dewar, and a lot of customization. By expanding our existing capabilities with a lot of ingenuity and unique uses of equipment, we are able to not only observe but also accurately measure the shape and geometry of the microshutters at temperatures ranging from room temperature to less than 35 K. As we approach the ramp-up to flight arrays, we continue to improve our process to provide the greatest amount and quality of analysis.

In addition to the equipment on Center, we also have an agreement to collaborate with Lehigh University, which OTT helped put in place. Lehigh's Nano- and Micro-Mechanical Behavior Laboratory offers equipment that complements our capabilities here at Goddard. This research collaboration will not only provide us with a very useful understanding of the thin-film materials used in the microshutters but also begin to build a foundation for materials selection for future missions.

How else have you been working with OTT?

Most of my work with OTT has been focused on the development of a real-time optical parylene thickness sensor.

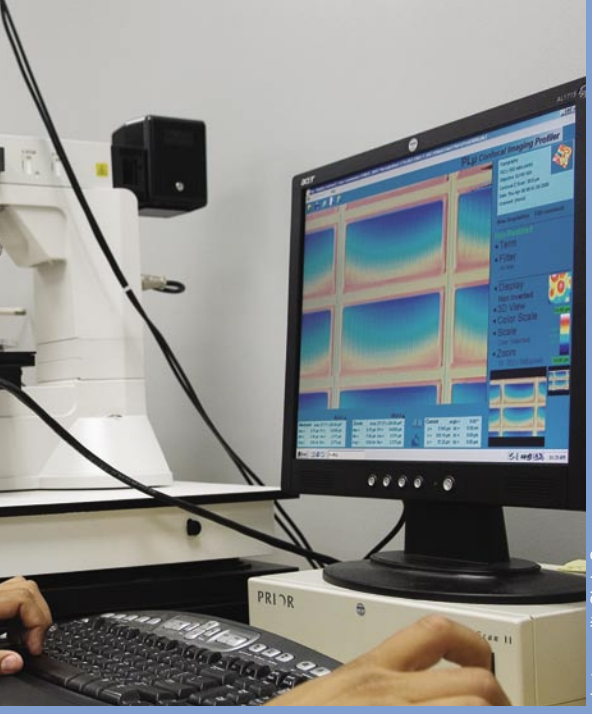


photo credit: Chris Gunn

derfer

Why is such a technology needed?

Advanced applications of thin-film parylene are limited by the precision of the deposition. In these applications, the accuracy of the thin-film's thickness is paramount. Yet vapor-deposited films traditionally are applied with a large tolerance. So devices that require accurate thicknesses—to less than 3 µm—need to monitored *in situ* to achieve a precise coating. This kind of monitoring is expensive and not very reliable, which results in material waste as well.

But your sensor addresses this issue?

Yes. With accuracy greater than 95%, the sensor provides real-time measurements of deposited film thickness ranging from 0.5 to 30 µm, greatly improving thickness control. It also provides alerts of batch-to-batch process variations and enables precise and repeatable controls, which lowers production time and cost.

How was OTT involved in this technology development?

OTT has been generous in providing me with the capabilities to pursue the development of this and other parylene-related technologies when there was no direct project collaboration. In addition, through various forums they have provided exposure for the technologies outside of Goddard, which has led to invaluable collaboration and incentives that would have been impossible for me to achieve from within my laboratory bubble.

What do you see as the value of technology transfer?

In addition to its support during technology development, OTT is able to act as a liaison to other industries that can make use of our developments. OTT's links to the outside world have proven to be quite beneficial.

Any advice for your colleagues?

Step away from your day-to-day work and look at it with fresh eyes. We all do some really amazing and cutting-edge things, which are reportable technologies to the OTT. I've found that there are parts and processes that we develop to accomplish our daily duties that should be reported to the OTT, even though to us it might not seem as such. It is a relatively painless process, and the benefits have the potential to be great.

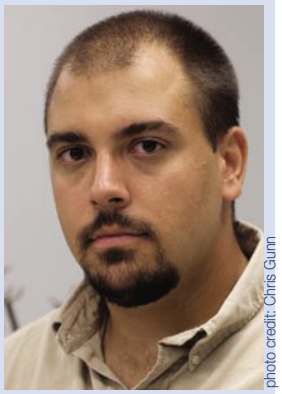


photo credit: Chris Gunn

Code: 541

Years at NASA: 4

Born: Lebanon, Pennsylvania

Education:

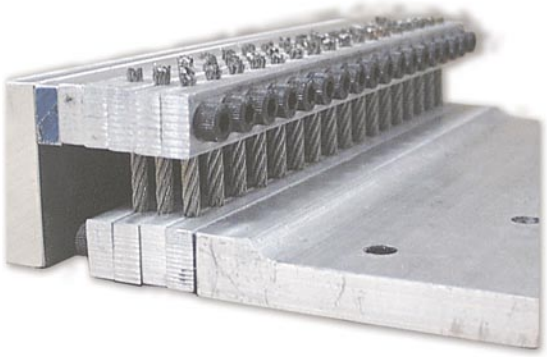
M.S., Mechanical Engineering, University of Maryland–College Park

B.E., Mechanical Engineering, Vanderbilt University

Goddard Technology Benefits PT Patients, Soldiers, Children

In 2003, Connecticut-based Enduro Medical Technology put out a new product called the Secure Ambulation Module (S.A.M.), which includes technology developed at Goddard. Since then, the company and its physical therapy (PT) walker have made great strides into the marketplace. The adult version of S.A.M. is now in use at Walter Reed Army Medical Center in Washington, D.C., as well as at Kindred Hospital of Greensboro, N.C. A youth version called S.A.M.-Y also has been introduced.

The S.A.M. walker provides a safe, stable standing environment by placing the user in a pelvic harness connected to the wheeled frame. The key to S.A.M.'s success is a cable-compliant joint developed at Goddard by the late **James Kerley**. This technology uses short segments of cable to connect structural elements. Unlike rigid connections, the configuration of the cable segments allows movement in six directions, enabling subtle cushioning and twisting as well as shock absorption. Originally used in robotics research, the technology provided compliance when robots needed to grip or join objects, having enough "give" to keep the contact forces low while generating enough counter-force to activate sensors.



Dr. Kerley later worked with **Wayne Eklund** (Sigma Space Corp.) and **Allen Crane** (Swales Aerospace) to incorporate the mechanism into a walker that supported the pelvis. Suffering from arthritis himself, Dr. Kerley knew that an important part of pain management was alleviating the weight on the legs. The cable-compliant technology allowed the harness to control the pelvis, providing support and stability with compliance that mimicked the movement of the hip joint.

Enduro licensed Goddard's cable-compliant and walker technologies and developed S.A.M. as well as a device called the Sit-to-Stand. These devices are now improving the lives of our nation's soldiers. At Walter Reed, S.A.M. is being used to help patients with traumatic injuries to the spinal cord and brain. "These patients require their leg muscles to be rebuilt or have had their leg muscles start to atrophy while recovering from major surgeries," explained Enduro's president Ken Messier. "The stories of the assistance these soldiers are getting from S.A.M. are quite remarkable."

One active military patient who was wheelchair-bound for 2 years due to a thoracic spinal cord injury is now up and walking with S.A.M. "When we first put him in the walker, he was up and going for 25 minutes," said Messier. "He's now

walking for up to 25 minutes every day and even using S.A.M. to perform exercises to strengthen his leg muscles."

Former Army sergeant Herbert Geddis of Springfield, Va., used the S.A.M. walker as an integral part of his recovery from neurosarcoid, a rare disease that afflicted his spine, taking away all of his lower body muscle strength. "The S.A.M. walker prevented my knees from buckling and helped me regain my mobility," said Geddis. "I was able to graduate to the therapy on the parallel bars a lot quicker as a result."

Physical therapists at Kindred Hospital have discovered yet another use for the device. "We use S.A.M. with bariatric patients–individuals who are remarkably overweight," said Mark Castleberry, director of rehabilitation services. "We have two S.A.M. [devices] and are currently using one to aid a gentleman who is over 600 pounds."

Castleberry explained that "bariatric patients in long-term acute facilities like ours are bedridden and have not used their legs for quite some time. Their legs cannot support their body weight, preventing them from rising to a standing position or walking on their own." Using S.A.M. reduces the pressure on the legs and allows them a chance for increased exercise until they are strong enough to stand on their own. "S.A.M. helps us to help them strengthen their whole lower body," said Castleberry.

But adults are not the only ones who can benefit from the S.A.M. technology. At Space Day, an event at Goddard for sixth graders, Enduro demonstrated S.A.M.-Y. "We probably had at least fifty kids try S.A.M.-Y, including three who were in wheelchairs," said Messier. By allowing children otherwise confined to a wheelchair to stand, S.A.M.-Y improves circulation, trunk strength, kidney and lung function, and posture.

But perhaps more important are the psychological benefits offered by S.A.M.-Y. "This was one of the few times those kids were able to be at the same height as their peers," Messier remarked. "Their classmates were so excited, they were cheering them on."

As C.T. Reed Elementary School teacher Linda Turner observed, "They obviously were having a good time and liked all the attention that they were getting. I think that the S.A.M.-Y made it easier for them to walk. They both could stand up much straighter and did not seem to take as much effort as with their walkers."

The Office of Technology Transfer is proud to announce the recent signing of four partnership agreements.

partner	technical area	agreement
National Institute of Standards and Technology (NIST)	Nanotechnology	MOU
Smithsonian Astrophysical Observatory (SAO)	Optics	Simplified SAA
State of Maryland's Dept. of Business and Economic Development (DBED)	Various	MOU
University of Baltimore	Various	SAA

MOU: Memorandum of Understanding
SAA: Space Act Agreement

National Institute of Standards and Technology

Under a memorandum of understanding with the National Institute of Standards and Technology, researchers from Goddard and NIST will be able to work together using joint expertise and NIST's state-of-the-art nanotechnology fabrication facilities to further their individual and joint research goals.

OTT facilitated the development and signing of the memorandum of understanding, which enables collaboration between Goddard and NIST researchers to further advances in nanotechnology. The agreement is also expected to save taxpayer money by enabling Goddard scientists to use NIST's new $350 million research facilities rather than duplicate these facilities at NASA.

"By having access to these state-of-the-art facilities and capabilities at NIST, Goddard can focus its resources on the validation of these miniaturized technologies to accelerate their maturity for space flight applications supporting scientific research and NASA's vision for space exploration," said Goddard's chief technologist **Peter Hughes** (Code 502).

The agreement calls for the two organizations together to define and manage research projects in nanoscience and microelectromechanical systems (MEMS) device design, technologies, operational protocols, fabrication technologies, and device metrology for use in chemical and biological detectors, power generation, thermal management systems, radio frequency electronics, electro-optic devices, and distributed sensor networks.

The collaborative research could have far-reaching benefits for many scientific areas. "Specific progress can be made in radiation-tolerant memory devices for all space missions, biological sensors to detect the presence of life at distant bodies, and multi-functional materials for next-generation robotics and vehicles," Hughes said. "The applications and target mission uses in this emerging technology area are diverse, compelling, and exciting."

Maryland's Department of Business and Economic Development

In the future, the Maryland state motto could become "To Boldly Go" with some of NASA's forthcoming exploration efforts having a very home-grown feel. That's because of the agreement Goddard signed with DBED to attract high-technology companies to the state.

The agreement enables collaboration between Goddard and DBED. The mutually beneficial agreement will help bolster economic growth in Maryland while helping to support NASA missions. The agreement also will help supplement Goddard's research skills by facilitating technical exchanges with local organizations to study new aerospace trends, methods, and challenges that may benefit NASA missions. "DBED can certainly help us bolster the skills and expertise at Goddard by bringing technology collaborators with similar research interests to the state," said OTT chief **Nona Cheeks**. And by leveraging local technical labor and education resources, Goddard may also strengthen its strategic technical advantage.

The State of Maryland stands to reap significant benefits from the agreement as well. With a strong interest in stimulating local economic growth, DBED can leverage collaboration with Goddard to demonstrate educational, financial, and business resources that technology companies require. "We can help each other," said Cheeks. "DBED can help us find scientists in industry that may help us further our missions. And at the same time, by demonstrating the need for those researchers in Maryland, we can help DBED meet some of its economic milestones."

The agreement calls for the two organizations to collaboratively develop outreach programs, workshops, and other meetings related to Goddard's technology needs. Goddard also will provide DBED with information related to its facilities and technological expertise that will be of interest to technology companies. In turn, DBED will facilitate collaboration between Goddard researchers and regional labs, as well as academic and business organizations, to develop joint technology ventures.

activities/benefits

- Allows for cross-lab collaboration
- Provides Goddard with access to NIST's state-of-the-art facilities

- Allows SAO to obtain experimental data four times faster than with commercial optical coatings
- Simplified SAA allows for rapid review and approval of routine, low-cost, small-scope projects

- Develop outreach programs, workshops, etc. related to Goddard's technology needs
- Facilitate collaborations between Goddard and regional labs, universities, and companies

- Students and faculty choose Goddard technologies to analyze/evaluate each semester
- Reports are provided to Goddard's OTT

Smithsonian Astrophysical Observatory

Researchers at the Smithsonian Astrophysical Observatory conduct laboratory experiments to study and measure cross-sections for electron impact excitation in multiply-charged ions. This process is the source for all light from the sun; however, most cross-sections for producing light in the extreme ultraviolet (EUV) range are known only from theoretical calculations. Experimental data are needed to validate the theoretical methods, to understand the processes, and therefore to explain the distributions in the intensities and wavelengths of the sun's light.

Because such experiments require mirrors that can reflect and focus light over a wide range of wavelengths, SAO turned to Goddard as the space-optics leader. Not only had Goddard researchers developed an innovative coating that allows a mirror to efficiently reflect light from the red wavelengths down to the EUV range, but Goddard had the thin-film coating facility to do it.

"Goddard is the only place in the country that does this kind of coating," explained SAO's **Larry Gardner**. "We could have tried to make do with a commercial coating, but they're significantly less efficient. If we weren't able to access Goddard's facilities, it would have taken us four times as long to get the data we need. It has a big impact on our ability to do the experiments."

This work was performed under a new type of Space Act Agreement—that is, a Simplified SAA. "The Simplified SAA represents a new, faster process for routine work of a limited scope," said **Scott Owens** (Code 551), who is technology coordinator for Goddard's Optics Branch. "This template agreement can be routed through the legal and financial systems in a matter of weeks."

University of Baltimore

Starting in Fall 2006, liberal arts, law, and business students at the University of Baltimore will have the opportunity to work directly with Goddard researchers and technologies through the school's Lab to Market program. As part of the program, students will assess Goddard technologies and collaborate with university faculty and Goddard researchers to develop commercialization plans and potential licensing opportunities.

The agreement will enhance NASA's strategic technology objectives, providing Goddard with assessment information about potential applications and licensing opportunities for possible technology transfer efforts. As described by OTT's **Monica Montague**, "Goddard can benefit tremendously from the assessments the university students will conduct for our technologies. Using their insights, we'll be able to better understand additional applications and licensing opportunities."

The University of Baltimore's Center for Technology Commercialization (CTC) facilitates the commercialization of technologies from federal labs using a cross-disciplinary team approach. The Lab to Market program will be added to this list of collaborative efforts that teach hundreds of students to apply their knowledge and skills to real technologies.

Through the partnership with Goddard, the students will gain hands-on experience with technology assessments and market-development plans. The agreement enables students and faculty to choose a set of Goddard technologies to work with for a semester. Teams of at least four students will analyze an assigned technology using intellectual property (IP) audits, brainstorming, security analyses, economic feasibility, development of return on investment, and other collaboration with researchers. Final reports from the teams will be made available to Goddard and will include arguments for their analyses, technology/market assessments, identification of IP issues, competition, market analyses, potential applications, and other valuable data.

Out and About with OTT

photo credit: Tom Grayson, FLC; all rights reserved

Technology transfer topics were on the agenda at two recent meetings attended by Goddard personnel.

- "Innovation and the 21st Century" was the theme of the annual conference of Technology Innovation Information, which was held in Newcastle Gateshead, UK. Members of this European independent association, including technology transfer and innovation support professionals, had the opportunity to hear OTT chief **Nona Cheeks** present on how the results of space-related research and development can bring "spinoff" benefits to business and society. After explaining what tech transfer means for NASA, Cheeks presented several examples of space-program technologies being successfully transferred to new applications related to medicine, public health, and public safety. She concluded with an overview of how NASA effects tech transfer.

- The Office of Patent Counsel's **Bryan Geurts** (Code 140) presented on the topic of open source software at the national meeting of the Federal Laboratory Consortium for Technology Transfer (FLC) in Minneapolis, Minn. Open source software involves the free distribution of a software program's source code. Few policies or guidelines delineate the government's position at other federal labs on this important issue. However, Goddard has made bold strides in this area, and Geurts chronicled this experience to FLC members. More information about open source software at Goddard is available online (http://opensource.gsfc.nasa.gov/).

Upcoming Meetings and Deadlines

Remember to file your New Technology Report before the submission deadline
For more information, contact the Office of Technology Transfer (6-5810 or techtransfer@gsfc.nasa.gov).

meeting	date/location	deadline	web site
MEMS 2007 (IEEE International Conference on Micro Electro Mechanical Systems)	January 21–25, 2007 Kobe, Japan	August 8 (25 copies of 600-word abstract)	http://www.conferences.jp/mems2007/
ICRA'07 (IEEE International Conference on Robotics and Automation)	April 10–14, 2007 Rome, Italy	September 15 (6-page paper)	http://www.icra07.org/
OFC/NFOEC 2007 (Optical Fiber Communication/National Fiber Optic Engineers Conference)	March 25–29, 2007 Anaheim, CA	October 5, noon (35-word abstract and 3-page paper)	http://www.ofcnfoec.org/
IMTC 2007 (IEEE Instrumentation and Measurement Technology)	May 1–3, 2007 Warsaw, Poland	October 6 (3- to 4-page abstract)	http://www.ewh.ieee.org/soc/im/imtc/imtc2007/
CVPR 2007 (IEEE Computer Society Conference on Computer Vision and Pattern Recognition)	June 17–22, 2007 Minneapolis, MN	November 27 (paper registration)	http://cvpr.cv.ri.cmu.edu

NASA Inventions and Contributions Board Awards

Many awards are available to NASA researchers, as managed by the Agency's Inventions and Contributions Board (ICB):

- Space Act Board Awards are bestowed for technologies with significant scientific and technical contributions. ***Value:*** Up to $100,000
- Patent Application Awards recognize the filing of a full (i.e., nonprovisional) patent application. ***Value:*** $500 (more than one inventor) or $1,000 (sole inventor)
- Software Release Awards are given when a software program has been approved for some form of public release. ***Value:*** $500 (more than one inventor) or $1,000 (sole inventor)
- Tech Brief Awards are given for technologies approved for publication in *NASA Tech Briefs*. ***Value:*** $350

To be eligible for any of these awards, innovations must have a New Technology Report on file. For the Space Act Board Award, NASA Form 1329 also must be completed.

OTT can help with the award application process. For more information:

- Go to the Awards page in the "News and Events" section of OTT's Web site (http://techtransfer.gsfc.nasa.gov)
- Contact the Award Liaison Officer: Dale Hithon (6-2691; Dale.L.Hithon@nasa.gov)

For more information on filing a New Technology Report, go to the eNTRe electronic filing system (http://entre.nasa.gov) or contact OTT (6-5810; techtransfer@gsfc.nasa.gov).

The following are awards issued by ICB during the third quarter of FY06.

Space Act Board Award

Microaltimeter by John Degnan (Code 690)

Micro Pulse Lidar by James Spinhirne (Code 613.1)

Patent Application Awards

Systems, Methods, and Apparatus for Direct Implementation of Formal Specifications Derived Mechanically from Information Requirements by Denis Gracanin (Code 581)

Systems, Methods, and Apparatus for Verification of Knowledge-Based Systems by Denis Gracanin (Code 581)

Software Release Awards

Goddard Mission Services Evolution Center (GMSEC) Architecture by John Bristow (Code 583), Jane Steck (Code 584), James Fessler (Lockheed Martin Space Operations), Robert Zepp (Computer Sciences Corp. [CSC]), Christopher Shuler (CSC), Brian Gregory (Interface & Control Systems), and Danford Smith (Code 581)

GMSEC Application Programming Interface by Arturo Mayorga (Code 583), Brian Gregory (Interface & Control Systems), and Christopher Shuler (CSC)

GMSEC Message Bus by John Bristow (Code 583) and Arturo Mayorga (Code 583)

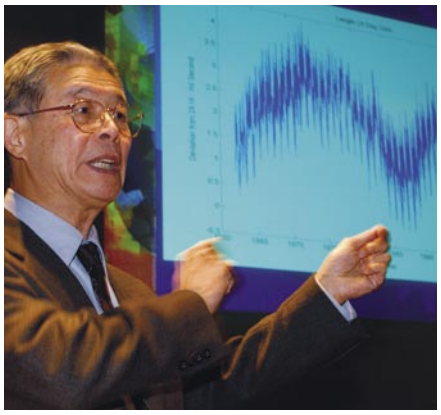
Innovative Utilization of the Heap Data Structure for Efficient Determination of Best Merges for HSEG by James Tilton (Code 606.3)

Land Information System version 3.1 by James Geiger (Code 587), Paul Houser (George Mason Univ.), Sujay Kumar (Univ. of Maryland–Baltimore Co. [UMBC]), Luther Lighty (Code 587), Susan Olden (Code 586), Christa Peters-Lidard (Code 614.3) and Yudong Tian (UMBC)

LTM-LACE Task Manager by John Dorband (Code 695)

Method and System for Procedure Development and Verification by Formal Specifications Derived Mechanically from Informal Procedure Descriptions by Christopher Rouff (SAIC), Michael Hinchey (Code 581), James Rash (Code 581), and Denis Gracanin (Code 581)

Huang a Finalist for Service to America Medal



The Partnership for Public Service has selected Goddard's **Norden Huang** (Code 614.2) as a finalist for its Service to America Medals for his work on the Hilbert-Huang Transform (HHT). The awards pay tribute to America's dedicated federal workforce, highlighting those who have made significant contributions to our country. Dr. Huang was announced as a finalist in June; the final Service to America Medals will be awarded in September.

"It is an honor to be selected as a finalist for this award," said Dr. Huang. "It's been a pleasure and a privilege to work with so many great people–both inside and outside NASA–over the years. I am lucky to have found the HHT method so simple and yet versatile, and I am really pleased to have that work recognized."

Winner of the 2003 NASA Government Invention of the Year award, HHT is a revolutionary, adaptive set of signal-analysis algorithms that can effectively analyze nonlinear and nonstationary signals. The importance of Dr. Huang's research on HHT is well demonstrated by the benefits and versatility the technology offers to a wide variety of fields, including several outside of NASA:

- Federal investigative organizations are working to incorporate HHT into systems to analyze speech patterns and identify individuals in recordings in forensic examinations.
- The Navy is using HHT in its research to improve submarine design and to more easily identify and locate different types of submarines.
- The Federal Highway Administration is using HHT in research related to monitoring bridge vibrations and for highway design and engineering studies.
- HHT is being used at Beth Israel Deaconess Medical Center to help diagnose sleep apnea and to detect patients with impaired blood flow regulation in the brain, which may increase the risk for stroke.
- Dr. Huang is involved in research at Johns Hopkins University using HHT to better understand how a wide variety of diseases, including avian flu and Dengue Fever, are propagated.

As noted by OTT chief **Nona Cheeks**, "HHT has been one of our most successful technology transfer projects. We are most grateful for Dr. Huang's commitment to technology transfer and are thrilled that he's being recognized for that commitment," said Ms. Cheeks.

metrics

Tech Transfer Metrics: March 1, 2006 to June 30, 2006

New Technology Reports: 20

**Software approved for release*

Active, Solid-State, 3-Dimensional Range Imaging System GSC-15184-1 by Vibart Scott (Code 694), James Blair (Code 694), and Luis Ramos-Izquierdo (Code 694)

Advanced Land Image Assessment System (ALIAS)* by Science Applications International Corp.

Analog Radio Interference Suppression System by Jeffrey Piepmeier (Code 555) and Joseph Knuble (Code 555)

Contamination Mass Transport Analysis Software* by David Hughes (Code 546)

Core Command and Data Handling (C&DH) Library* by Computer Sciences Corp.

Crossed Beam Roof Target Six-Degree-of-Freedom Tracking System and **Improvement to Fine-Alignment Technology of a Large Segmented Mirror** by ITT Space Systems Division

Cryogenic Hydrogen Radiation Shield by Shouvanik Mustafi (Code 552), Robert Boyle (Code 552), Edgar Canavan (Code 552), and Lisa Simonsen (NASA Langley)

D-Dimensional Formulation and Implementation of Recursive Hierarchical Segmentation and **Memory Efficient Serial Implementation of Recursive Hierarchical Segmentation*** by James Tilton (Code 606.3)

Dual Order Common Path Spectrometer by Ball Aerospace & Technology

Extendable USB Drive by Michael Hinchey (Code 581)

Frequency Diversity Doppler Processing by Remote Sensing Solutions, Inc.

Grants Document Generation System (GDGS)* by Indus Corp.

Microwave Rain Gauge by Center for Remote Sensing, Inc.

Modulated X-ray Source by Universities Space Research Association

Multiple Material Insert for Composite Sandwich Panels by Jason Hair (Code 543)

Ninety-Degree Close Quarters Facing Tool by Michael T Wilks (Code 597)

NUB: NPOESS User Block Tool* by Richard Ullman (Code 423)

Safe to Mate* by Moses McCall (Code 580)

Issued Patents: 1

U.S. Patent No. 7,060,968: Improved Optical, Absolute, Linear and Rotary Position Encoders Using Vertically Compressible Imaging by Doug Leviton (Code 551)

Patent Applications: 5

Gear Bearings and **Modular Gear Bearing** by John Vranish (Code 544)

Millimeter Wave Polarization Transformer by Northwestern University

SPAACE: Self Properties for an Autonomous and Autonomic Computing Environment by Lecturer In Informatics

Template for Deposition of Micron and Submicron Pointed Structures by Diane Pugel (Code 553)

Provisional Patent Applications: 6

Autonomic Smoke Detector and **Autonomic Quiescence** by University of Ulster–Northern Ireland

Broadband High Spurious-Suppression Microwave Waveguide Filter for Polarization-Preserving and Transformer by University of Maryland

Design of a Lightweight, Low-Power Magnetometer Based on a Single-Walled Carbon Nanotube Mat by Stephanie Getty (Code 541)

Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems Using an AOSE Methodology and **Method for Developing and Maintaining Evolving Systems with Software Product Lines** by University of Seville

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