

APL Achievement Awards and Prizes

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The prestigious Lifetime Achievement Award is APL's highest publication honor and is conferred only when an individual has produced an unusual assemblage of distinguished publications during a long and productive professional career at APL.

It serves not only to recognize and reward singular accomplishments but also to inspire others to that standard. Since the award's inception in 1986, only 13 have been conferred, the last one in 2004.

In 2009, the Editorial Board of the *Johns Hopkins APL Technical Digest* was pleased to announce its selection of Edmond C. Roelof for the special Lifetime Achievement Award. Dr. Roelof's professional career spans 35 years of exceptional achievement at APL. His major discoveries and accomplishments are documented in more than 385 scientific papers. He contributed significantly to our understanding of the Sun's corona, the interplanetary medium, and planetary magnetospheres. He is an acknowledged leader in the emerging field of energetic neutral atom imaging. His unique combination of scientific accomplishment, publication, and leadership helped shape the field of space plasma physics. Dr. Roelof has received numerous awards and has participated in hundreds of presentations at scientific meetings throughout the world.

The Master Inventor Award was established in 2006 to honor APL inventors who hold at least 10 U.S. patents. From APL's formal establishment in 1942 through 2008, only 22 active and retired employees met this unique criterion.

In 2009, the Office of Technology Transfer and the Office of Patent Counsel announced that Dr. Jack C.

Roberts had received his 10th patent and would be the next recipient of the Master Inventor Award. This honor makes Dr. Roberts the 23rd person in the history of the Laboratory to qualify for this unique award. His patents include polymeric composite bone implants, bone substitutes for use in medical training and in-torso models for measuring the effects of impacts, and materials for use in body armor. In addition to his 10 patents, he has published more than 100 papers in refereed journals. Dr. Roberts was also the recipient of the Invention of the Year Award in 2005.

Unlike the special awards for Lifetime Achievement and Master Inventor, the Publication Awards, the R. W. Hart Prizes Honoring Excellence in Independent Research and Development (IR&D), and the Invention of the Year Awards are annual competitions that represent the Laboratory's best in writing, research, development, and technology from the preceding year. These programs recognize outstanding individuals who advance science, technology, and education through excellence in technical publications, achievement in IR&D efforts, and innovative thinking that leads to the invention of new technologies.

Professional publication in refereed journals is central to scientific communication and is the medium by

which important results and innovations are promptly and accurately recorded and disseminated. To encourage and reward exceptional scholarship, the Editorial Board of the *Digest* solicits from each APL department nominations for publications considered to be outstanding. Recognition includes awards and honorable mention for winning publications. Departments may submit up to two nominations in each of six categories. Judges base their selections on significance and clarity, with considerably greater weight given to the significance of the work in advancing science, engineering, or the mission of the Laboratory. In 2009, seven technical departments submitted 35 publications from those published in 2008. Of these, six publications from four departments won awards and one paper received honorable mention.

The value of a premier R&D organization is its ability to understand national mission needs, turn them into research and engineering challenges, and meet those challenges through the scientific and technical expertise of its staff. The Hart Prizes and the Invention of the Year Awards both support APL's resolve to foster and bring forth new technologies and concepts to meet the nation's critical challenges.

The Hart Prizes recognize significant contributions to the advancement of science and technology by APL staff. The IR&D Advisory Council sponsors the competition and solicits from each APL department nominations of science and engineering projects considered to be outstanding. The projects are evaluated by the Advisory Council, and prizes are awarded in two categories: one for the best research project and the other for the best development project. In 2009, five departments nominated 10 projects from those active in 2008: five for research and five for development. Of these, two prizes and one honorable mention were awarded in the research category, and one prize and one honorable mention were awarded in the development category.

The Invention of the Year Awards program encourages new technology and innovation at the Laboratory and identifies the top technology from the preceding year. For 2008, 222 APL researchers disclosed 129 inventions; of these, two won honors. The disclosures were judged by an independent review panel of technical and business consultants, technology transfer professionals, and intellectual property attorneys. Judges based their selections of the winning technologies on creativity, novelty, improvement over existing technology, commercial potential, and probable benefit to society. Trophies and cash awards were presented to the winning inventors. There are also special awards granted for innovative contributions in different areas.

APL holds awards ceremonies throughout the year to honor the recipients. The Master Inventor Award and the top two inventions for 2008 were announced at APL's 10th annual Invention of the Year Awards ceremony on 7 May 2009. The awards for Lifetime Achievement, meritorious writing, and prizes for outstanding IR&D projects were formally announced at the Principal Professional Staff Dinner on 10 November 2009. Additionally, an APL Colloquium featured the three IR&D Hart Prize winning projects on 1 December 2009, allowing dissemination of the technical content of the work to a broad audience.

The APL achievement awards and prizes reflect the outstanding work that has been done by APL staff. Their success did not come easily, but rather involved the commitment of significant amounts of time and resources. All have displayed perseverance, ingenuity, and a relentless commitment to excellence, critical components of APL's competitive strength.

The names and photographs of this year's awardees are displayed on the following pages, along with the titles and a brief description of their publications, projects, and inventions.



LIFETIME ACHIEVEMENT AWARD



Edmond C. Roelof

Edmond C. Roelof

In recognition of his outstanding scientific leadership in space plasma physics and of his seminal contributions to our understanding of the Sun's corona, the interplanetary medium, planetary magnetospheres, and energetic neutral atom imaging.

Edmond C. Roelof, Principal Professional Staff, Ph.D., Univ. of California, Berkeley, 1966, Space Plasma Physics

MASTER INVENTOR AWARD



Jack C. Roberts

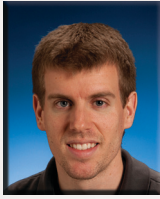
Jack C. Roberts

In recognition of his research in polymeric composite bone implants, bone substitutes for use in medical training and in-torso models for measuring the effects of impacts, and materials for use in body armor, resulting in 10 U.S. patents.

Jack C. Roberts, Principal Professional Staff, Ph.D., Rensselaer Polytechnic Inst., 1980, Human Injury Mitigation Due to Blast and Ballistic Events

PUBLICATION AWARDS FOR 2008

Author's First Paper in a Peer-Reviewed Journal



Sean R. O'Connor

For "Wideband Adaptive Feedforward Photonic Link," *IEEE Journal of Lightwave Technology* **26**(15), 2810–2816 (2008).

Fiber optic transport of analog signals using a self-adaptive control algorithm is shown to defeat the linearity limitations characteristic of previous photonic link demonstrations. This permits a single-hardware, feedforward, linearized architecture with simultaneous multiband input over critical military frequencies.

Sean R. O'Connor, Associate Professional Staff, B.S.E.E., Drexel Univ., 2007, RF Electronics

Honorable Mention, Author's First Paper in a Peer-Reviewed Proceedings



Brian J. Wadsley

For "An Investigation into the Kinetic Intercept Threat to a U.S. Navy Strike Missile," *Proceedings of the 2008 AIAA Missile Sciences Conference, Session 6, Paper 6-4* (2008).

A different type of strike missile (other than strictly ballistic) for next-generation development is described. The potential impact of a ballistic missile defense on a future U.S. missile system is highlighted, and the benefits of launching missiles from certain submarine operating areas are discussed.

Brian J. Wadsley, Associate Professional Staff, M.S., Pennsylvania State Univ., 2007, Missile Modeling and Simulation

Outstanding Paper in the Johns Hopkins APL Technical Digest

Walter G. Berl Award



Howard S. Burkom



Wayne A. Loschen

For "Tradeoffs Driving Policy and Research Decisions in Biosurveillance," *Johns Hopkins APL Technical Digest* **27**(4), 299–312 (2008).

Eight years of research, development, and user experience are synthesized into an analysis of future public health issues. Data protocols, data transfer, decision support tools, and a Bayes Network strategy are discussed as ways to produce a robust, distributed, goal-driven alerting of public health events.

Zaruhi R.
Mnatsakanyan

Joseph S. Lombardo

Howard S. Burkom, Principal Professional Staff, Ph.D., Univ. of Illinois at Urbana–Champaign, 1976, Designing and Implementing Solutions to Applied Problems in Epidemiology and Physical Sciences; **Wayne A. Loschen**, Principal Professional Staff, M.S., JHU, 2002, Managing Large Databases of Environmental and Health-Related Data; **Zaruhi R. Mnatsakanyan**, Senior Professional Staff, Ph.D., State Engineering Univ. of Armenia, 2000, Heterogeneous Information Fusion and Distributed Information Systems Architectures; **Joseph S. Lombardo**, Principal Professional Staff, M.S., JHU, 1974, Developing Automated Tools to Enhance Disease Surveillance

Outstanding Research Paper in an Externally Refereed Publication



Ralph L. McNutt Jr.



David J. Lawrence



Stamatios M. Krimigis



Scott L. Murchie

For "Return to Mercury: A Global Perspective on MESSENGER's First Mercury Flyby," *Science* **321**(5885), 59–62 (2008).

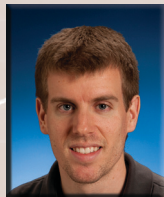
MESSENGER imaged 21% more of Mercury's surface beyond the 45% surface coverage provided by Mariner 10 encounters. Surface iron content is found to be, surprisingly, no greater than that of the Moon and Earth, despite the supposition that Mercury is 60% iron overall.

Ralph L. McNutt Jr., Principal Professional Staff, Ph.D., Massachusetts Inst. of Technology, 1980, Space Physics and Planetary Science; **David J. Lawrence**, Senior Professional Staff, Ph.D., Washington Univ., 1996, Planetary Neutron and Gamma-Ray Spectroscopy; **Stamatios M. Krimigis**, Principal Professional Staff, Ph.D., Univ. of Iowa, 1965, Space Plasma Physics; **Scott L. Murchie**, Principal Professional Staff, Ph.D., Brown Univ., 1988, Geology and Planetary Science; **Sean C. Solomon**, **Thomas R. Watters**, **William C. Feldman**, **James W. Head**, **Roger J. Phillips**, **James A. Slavin**, and **Maria T. Zuber** (non-APL staff)

Outstanding Development Paper in an Externally Refereed Publication



Marc B. Airola



Sean R. O'Connor



Michael L. Dennis



Thomas R. Clark Jr.

For "Experimental Demonstration of a Photonic Analog-to-Digital Converter Architecture with Pseudorandom Sampling," *IEEE Photonics Technology Letters* **20**(24), 2171–2173 (2008).

A photonics realization capable of defeating normal Nyquist–Shannon sampling theory limits is described. The broadband, high dynamic range and fine temporal resolution were merged with a novel nonuniform sampling technique. This allows lower speed and higher dynamic range electronics for the quantization of wideband input signals.

Marc B. Airola, Senior Professional Staff, M.S., Univ. of Utah, 2004, Electro-Optical and Infrared Systems; **Sean R. O'Connor**, Associate Professional Staff, B.S.E.E., Drexel Univ., 2007, RF Electronics; **Michael L. Dennis**, Principal Professional Staff, Ph.D., Univ. of New Mexico, 1991, Photonic Systems and Technologies; **Thomas R. Clark Jr.**, Principal Professional Staff, Ph.D., Univ. of Maryland, College Park, 1998, Microwave Photonics

Outstanding Professional Book



Ralph Lorenz

For *Titan Unveiled: Saturn's Mysterious Moon Explored*, Princeton University Press, Princeton, NJ (2008).

The Cassini-Huygens Probe reveals that Titan is strikingly like Earth. Discoveries include methane monsoons, equatorial sand seas, and Titan's polar hood. "Titan Unveiled" conveys the thrill and excitement of scientific discovery enhanced by lively personal anecdotes.

Ralph Lorenz, Senior Professional Staff, Ph.D., Univ. of Kent at Canterbury, United Kingdom, 1994, Planetary Science; **Jacqueline Mitton** (non-APL staff)

Outstanding Special Publication



Russell Keith Raney

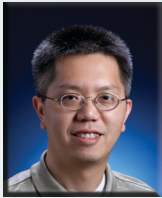
For "Space-Based Remote Sensing Radars," Chap. 18, in *Radar Handbook*, M. I. Skolnik (ed.), 3rd Ed., McGraw-Hill, New York (2008).

Technical background is provided on synthetic aperture radar, radar altimeters, and scatterometers. Space-based radars are proving to be a key technology for measuring sea-level rise, ice mass, biomass, and military situational and battle awareness.

Russell Keith Raney, Principal Professional Staff, Ph.D., Univ. of Michigan, 1968, Satellite Radars, Altimeters, and Imagers

R. W. HART PRIZES FOR 2008

Excellence in Research



I-Jeng Wang



Dennis G. Lucarelli



Philippe M. Burlina



Daniel F. DeMenthon



Anne A. Jorstad



Anshu Saksena

For "Information Fusion and Localization in Distributed Sensor Systems"

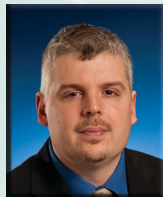
The goal of this multiyear IR&D project is to address unique challenges in information processing, information fusion, and resource optimization for large-scale wireless sensor networks (WSN) used to detect the presence (or arrival) of target objects in the area covered by the WSN (also called a distributed sensor network or a sensor field).

I-Jeng Wang, Principal Professional Staff, Ph.D., Purdue Univ., 1996, Control, Optimization, and Sensor Networks; **Dennis G. Lucarelli**, Senior Professional Staff, D.Sc., Washington Univ., 002, Sensor Networks and Machine Learning; **Philippe M. Burlina**, Principal Professional Staff, Ph.D., Univ. of Maryland, College Park, 1994, Machine Vision and Machine Learning; **Daniel F. DeMenthon**, Senior Professional Staff, Ph.D., Univ. Joseph Fourier, Grenoble, France, 1993, Image Understanding and Computer Vision; **Anne A. Jorstad**, Temp-on-Call, Full-Time Student, M.A., Univ. of Wisconsin, 2007, Computer Vision; **Anshu Saksena**, Senior Professional Staff, M.S., Univ. of Maryland, College Park, 1996, Probabilistic Modeling and Distributed Inference

Excellence in Research



Chad M. Hawes



Gregory S. Avicola



E. David Jansing



Michael E. Nord



Rickey D. Chapman

For "Exploitation of Synthetic Aperture Radar Data Products"

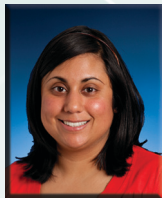
The extent to which synthetic aperture radar data contain information about a moving object that can be exploited has not been well understood. Information on the time history of the moving object [position, velocity, and higher moments (e.g., acceleration, jerk, etc.)] was studied and could prove very useful for various image analysis applications.

Chad M. Hawes, Senior Professional Staff, M.S., Drexel Univ., 1996, Remote Sensing, Detection, and Signal Processing; **Gregory S. Avicola**, Senior Professional Staff, Ph.D., Univ. of Delaware, 2003, Ocean Physics; **E. David Jansing**, Senior Professional Staff II, Ph.D., Univ. of Louisville, 1997, Remote Sensing Algorithm Development; **Michael E. Nord**, Senior Professional Staff, Ph.D., Univ. of New Mexico, 2005, Remote Sensing Scientist; **Rickey D. Chapman**, Principal Professional Staff, Ph.D., Florida State Univ., 1987, Ocean Remote Sensing

Excellence in Development



Joshua L. Santarpia

Shanna A.
Ratnesar-Shumate

Kelly Marie Brinkley



Jason J. Quizon



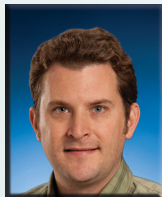
Nathan A. Hagan



Plamen A. Demirev



Albert J. Paul Jr.



Evan P. Thrush



Thomas J. Buckley



Miquel D. Antoine



Neal A. Baker



David A. Kitchin

For "Environmental Changes on Biological Aerosol Particles"

Procedures were developed to examine the atmospheric processes affecting the physical, chemical, and biological properties of airborne microorganisms, allowing us to understand the background of biological aerosols in the environment, the fate of biological aerosols intentionally released into the environment, and the potential respiratory transmission of some diseases.

Joshua L. Santarpia, Senior Professional Staff, Ph.D., Texas A&M Univ., 2005, Aerosol Science; **Shanna A. Ratnesar-Shumate**, Associate Professional Staff II, M.E., Univ. of Florida, 2005, Aerosol Science; **Kelly Marie Brinkley**, Associate Professional Staff II, M.S., Washington Univ., 2006, Mechanical Design of Flow Systems; **Jason J. Quizon**, Senior Professional Staff, B.S., Biology, Towson Univ., 1999, and B.S., Information Systems, Villa Julie College, 2002, Aerosol Scientist; **Nathan A. Hagan**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 2006, Mass Spectrometry Applications; **Plamen A. Demirev**, Senior Professional Staff, Ph.D., Bulgarian Academy of Sciences, 1988, Rapid Detection of Chemical and Biological Agents; **Albert J. Paul Jr.**, Leased Worker (Grove Resource Solutions Inc.), Ph.D., Howard Univ., 1988, LiF, Photoluminescence, and Raman Spectroscopy; **Evan P. Thrush**, Senior Professional Staff, Ph.D., Stanford Univ., 2004, Optical Sensors; **Thomas J. Buckley**, Senior Professional Staff, Ph.D., Univ. of Florida, 1982, Chemical Instrumentation, Research, and Development; **Miquel D. Antoine**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 1998, Chemical and Biological Sensor Develop-

ment; **Neal A. Baker**, Support Staff, A.A., Electronics Technology, Community College of Baltimore County, 1987, Test Bed Operation; **David A. Kitchin**, Principal Professional Staff, M.S., Univ. of Rhode Island, 1975, Systems Engineering and Quality Management

Honorable Mention in Research



Dawnielle Farrar



David M. Lee

For "Applications for Piezo Polymer Composites"

Basic research was conducted on a new class of piezoelectric polymer composite materials, or "engineered" materials, with tailorable mechanical and electrical properties. These engineered materials have the potential of being easily fabricated into complex shapes, allowing for piezoelectric applications in acoustics, vibration mitigation, and energy harvesting.



George L. Coles Jr.



Carl L. Carpenter

Dawnielle Farrar, Senior Professional Staff, M.S., JHU, 2003, Piezoelectric Materials, Microelectromechanical Systems, Sensors, and Transducers; **David M. Lee**, Associate Professional Staff II, Microelectronics Processing; **George L. Coles Jr.**, Senior Professional Staff, M.S., JHU, 2002, Micro-Electronics Process Engineer; **Carl L. Carpenter**, Associate Professional Staff, Senior Mechanical Designer

Honorable Mention in Development



George C. Ho



Glenn M. Mason



Gordon Bruce Andrews

For "ULEIS Jr."

A miniature version of the Ultra-Low Energy Isotropic Spectrometer (ULEIS) was developed, winning a \$20M flight opportunity for the Laboratory. It is a high-resolution, time-of-flight mass spectrometer that measures energetic ions with sufficient resolution to distinguish where, how, and from what materials energetic ions are accelerated close to the Sun within the heliosphere.



Kenneth S. Nelson



Egidio J. Rossano



James C. Hutcheson

energetic Particle Radiation; **Gordon Bruce Andrews**, Principal Professional Staff, M.S., Electrical Engineering, JHU, 1983, Energetic Particle Instrumentation; **Kenneth S. Nelson**, Senior Professional Staff, Ph.D., Univ. of Wisconsin, Madison, 1986, Particle Detectors; **Egidio J. Rossano**, Senior Professional Staff, B.S., Univ. of Maryland, 1986, Mechanical Engineering; **James C. Hutcheson**, Associate Professional Staff, Instrument Development, Assembly, and Testing

INVENTION OF THE YEAR AWARDS FOR 2008



Lance M. Baird



Jason J. Benkoski



Andrew F. Mason



Jennifer L. Sample

For “Triggered Drug Release via Physiologically Responsive Polymers”

A self-regulated, polymer-based drug delivery system was designed to perform the work of both a sensor and an automated dispenser. The technology makes use of associative antibody–antigen bonds to hold together polymer chains into cross-linked macromolecular assemblies and to be triggered by the physiological production of biomarkers.

Lance M. Baird, Associate Professional Staff I, B.S., Austin Peay State Univ., 2006, Materials Chemistry; **Jason J. Benkoski**, Senior Professional Staff, Ph.D., Univ. of California, Santa Barbara, 2003, Nanotechnology and Smart Materials; **Andrew F. Mason**, Senior Professional Staff, Ph.D., Cornell Univ., 2005, Chemist; Synthesis and Polymer Chemistry; **Jennifer L. Sample**, Senior Professional Staff, Ph.D., Univ. of California, Los Angeles, 2001, Nanomaterials, Physical Chemistry, and Nanotechnology



Harry K. Charles Jr.

Arthur Shaun
Francomacaro

Allen C. Keeney



Seppo John Lehtonen

For “Ultra-Thin, Flexible Multichip Modules Using Standard Microelectronic Assembly Techniques”

An electrical substrate having superior dielectric properties that measure only 2 μm per dielectric layer was invented. These layers, developed by using cost-effective standard assembly techniques, are an order of magnitude thinner than the current state of the art for thin, printed wiring board material.

Harry K. Charles Jr., Principal Professional Staff, Ph.D., JHU, 1972, Electronic Devices, Packaging, and Reliability; **Arthur Shaun Francomacaro**, Principal Professional Staff, M.S., Electrical Engineering, JHU, 1992, and M.S., Technical Management, JHU, 1999, Microelectronic Process Development; **Allen C. Keeney**, Senior Professional Staff, M.S., JHU, 2007, Electronic Process Engineering; **Seppo John Lehtonen**, Senior Professional Staff, B.S., Florida Atlantic Univ., 1985, Advanced Microelectronics Packaging Technology