


## APL Achievement Awards and Prizes

Linda L. Maier-Tyler



*Through a selection of publications, projects, and inventions from the preceding year, APL conducts awards programs to honor staff who meet an established standard of excellence in professional publication, innovative work in independent research and development (IR&D) projects, and novel concepts leading to the invention of new technologies. Awards and prizes are conferred as a way of honoring these individuals not only for vision and patient effort but also for enhancing and sustaining APL's commitment to quality. The Publication Awards, the R. W. Hart Prizes honoring excellence in IR&D, and the Invention of the Year Awards are annual competitions that represent the Laboratory's best in writing, research, development, and technology.*

To encourage the APL staff to publish in refereed journals and other specialized publications, the Editorial Board of the *Johns Hopkins APL Technical Digest* solicits from each APL department nominations for publications considered to be outstanding from the previous year to compete in an annual writing competition. Recognition includes awards 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 2008, nine technical departments submitted 36 publications from those published in 2007. Of these, seven publications from six departments were selected for honors.

The R. W. Hart Prizes for Excellence in Independent Research and Development (IR&D) recognize significant contributions to the advancement of science and

technology. Named for Robert W. Hart, who led APL's effort in independent research and exploratory development from 1972 until his retirement in 1989, the Hart Prizes signify the importance of the IR&D Program to the long-term future of the Laboratory. Similar to the process for the writing awards, the IR&D Advisory Council solicits from each APL department nominations of science and engineering projects considered to be outstanding from the previous year. 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 2008, five departments nominated 10 projects from those active in 2007: four for research and six for development. One prize and one honorable mention were awarded in the research category, and one prize and two honorable mentions were awarded in the development category.

The Invention of the Year Awards identify and reward the top technologies from the hundreds representing the work of the past calendar year. During 2007, 177 APL researchers disclosed 125 inventions. 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. The top three inventions were announced during the ninth annual Invention of the Year awards ceremony on April 16, 2008. The awards for meritorious

writing and prizes for outstanding IR&D projects were formally announced at the Principal Professional Staff Dinner on November 18, 2008.

The entries for these competitions were diverse and exemplary, comprising a body of work that spanned nine departments and dealt with concepts presented to the scientific and engineering community for the first time. The recipients of these prestigious APL awards are strong leaders who achieve results and consistently demonstrate a relentless commitment to excellence in their work. Their names and photographs are displayed on the following pages, along with the title and a brief description of their honored publications, projects, and inventions.

## PUBLICATION AWARDS FOR 2007

### Author's First Paper in a Peer-Reviewed Journal (Tie)

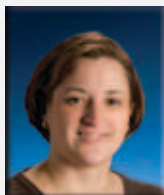


Amy K. Castner

For "An Agent-Supported Simulation Framework for Metric-Aware Dynamic Fidelity Modeling," *Proceedings of the 2007 Agent-Directed Spring Simulation Symposium (ADS'07)*, Vol. 1, pp. 79–86 (2007).

An innovative approach to network simulation is presented that enables intelligent application of fidelity, consistent with stated metrics. The concept allows for segmentation of the simulation, creating an "agent per segment" framework where each agent can dynamically choose among multiple models to simulate their segment.

**Amy K. Castner**, Senior Professional Staff, M.S., JHU, 2005, Information Operations Analysis



Megan R. Leahy-Hoppa

For "Wideband Terahertz Spectroscopy of Explosives," *Chemical Physics Letters* **434**, 227–230 (2007).

Time-domain spectroscopy is used to report the terahertz absorption spectra for four explosives in the range from 0.5 to 6 THz. Because clothing is transparent in the terahertz region, this technique can be used to perform spectral identification of hidden materials at security checkpoints.

**Megan R. Leahy-Hoppa**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 2006, Sensor Science

---

### Outstanding Paper in the *Johns Hopkins APL Technical Digest*

#### *Walter G. Berl Award*



Anthony T. Y. Lui

For "Solving a Four-Decade-Old Mystery," *Johns Hopkins APL Technical Digest* **27**(3), 233–238 (2007).

Dynamic auroral displays at polar latitudes are manifestations of space substorms that can affect space assets and cause ground-level power blackouts. The location where a substorm initiates is a mystery. This paper describes how the five-satellite NASA mission THEMIS (Time History of Events and Macroscopic Interactions during Substorms) will discriminate between two competing substorm models to predict the site where substorms initiate.

**Anthony T. Y. Lui**, Senior Professional Staff, Ph.D., Univ. of Calgary, Canada, 1974, Space Plasma Analysis

## Outstanding Research Paper in an Externally Refereed Publication



Joshua Broadwater

For “Hybrid Detectors for Subpixel Targets,” *IEEE Transactions on Pattern Analysis and Machine Intelligence* **29**(11), 1891–1903 (2007).

Subpixel targets with significantly low reflectance in complex environments are a challenging problem in hyperspectral imagery analysis. This paper describes a novel hybrid detector that combines a statistical hypothesis and a physics-based linear-mixing model for background description, allowing for subpixel target discrimination.

**Joshua Broadwater**, Principal Professional Staff, Ph.D., Univ. of Maryland, 2007, Pattern Recognition and Remote Sensing; **Rama Chellappa** (non-APL staff)

---

## Outstanding Development Paper in an Externally Refereed Publication



Michael Vlahos

For “Fighting Identity: Why We Are Losing Our Wars,” *Military Review*, November–December, 2–12 (2007).

Non-state actors are driving us to fight according to their rules and to our disadvantage. Using a historical perspective, this paper argues that the United States is fighting the enemy’s war and is serving as the enemy’s enabler. In an era of rising new communities and movements, this may be our greatest challenge.

**Michael Vlahos**, Principal Professional Staff, Ph.D., Tufts Univ., Fletcher School of Law and Diplomacy, 1980, History and Anthropology

---

## Outstanding Professional Book



Walter W. Rice

For *How To Prepare Defense-Related Scientific and Technical Reports: Guidance for Government, Academia, and Industry*, Wiley Interscience, Hoboken, NJ (2007).

This book provides expert instruction on preparing defense-related reports, including classified scientific and technical material. The standards and regulations pertaining to Department of Defense documentation are fully clarified. Also, some of the official guidance on preparing defense-related scientific and technical reports may require interpretation, and in those cases the author provides a prudent analysis of that information and prescribes “best practices.”

**Walter W. Rice**, Senior Professional Staff, M.A., JHU, 1982, Technical Writing and Editing

---

## Outstanding Special Publication



Harry K. Charles Jr.

For “The Wirebonded Interconnect: A Mainstay for Electronics,” Chap. 3, in *Micro- and Opto-Electronic Materials and Structures: Physics, Mechanics, Design, Reliability, and Packaging*, Vol. 2, E. Suhir, Y. C. Lee, and C. P. Wong (eds.), Springer, pp. 71–120 (2007).

Wire bonding continues to be the key first-level interconnect scheme for the microelectronics industry. The shrinking of dimensions and the introduction of new pad and interface materials have forced the adoption of advancements in automation, welding kinetics, pad metallurgies, and higher-frequency ultrasonics.

**Harry K. Charles Jr.**, Principal Professional Staff, Ph.D., JHU, 1972, Electronic Devices, Packaging, and Reliability

## R. W. HART PRIZE FOR 2007

### Excellence in Research



Alan F. Becknell



Nathan A. Hagan



Robert S. Pilato



Kelly A. Van Houten



Plamen A. Demirev



Miquel D. Antoine



Timothy P. Lipka



Joshua L. Santarpia



Timothy J. Cornish



Jonathan W. Boyd



Neal A. Baker

#### For "Detection of Low-Vapor-Pressure Materials"

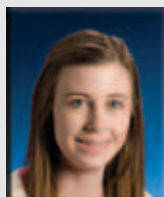
Detection of low-vapor-pressure materials is problematic because they are difficult to convey through sample lines, and insufficient material is present for direct detection as vapor. This IR&D project provides methods for detection of chemical warfare agents as aerosols of the pure material or as trace contamination on dry particulates, and additionally it addresses sample transport issues.

**Alan F. Becknell**, Senior Professional Staff, Ph.D., Yale Univ., 1986, Chemical Sensor Systems; **Nathan A. Hagan**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 2006, Mass Spectrometry and Biochemical Detection; **Robert S. Pilato**, Senior Professional Staff, Ph.D., Pennsylvania State Univ., 1989, Synthesis, Reactivity, Chemical Warfare, and Nuclear Defeat; **Kelly A. Van Houten**, Senior Professional Staff, Ph.D., Univ. of Maryland, 1996, Synthesis, Reactivity, Chemical Warfare, and Nuclear Defeat; **Plamen A. Demirev**, Senior Professional Staff, Ph.D., Bulgarian Academy of Sciences, 1988, Rapid Detection of Chemical and Biological Agents; **Miquel D. Antoine**, Senior Professional Staff, Ph.D., Univ. of Maryland, Baltimore County, 1998, Chemical and Biological Sensor Development; **Timothy P. Lipka**, Senior Professional Staff, Ph.D., JHU, 1998, Chemical Sensors and Signatures; **Joshua L. Santarpia**, Senior Professional Staff, Ph.D., Texas A&M Univ., 2005, Aerosol Science; **Timothy J. Cornish**, Senior Professional Staff, Ph.D., Univ. of North Carolina Chapel Hill, 1987, Development of Remote Biochemical Analysis Using Mass Spectrometry; **Jonathan W. Boyd**, Senior Professional Staff (temp-on-call), Ph.D., Texas Tech Univ., 2004, Mechanisms of Toxicity, Toxicodynamics, and Mixtures Interactions; **Neal A. Baker**, Support Staff, A.A. Electronics Technology, Essex Community College, 1987, Test Operations and Sample Collection

### Honorable Mention



Charles C. Young



Emily E. Seay



Terry E. Phillips

#### For "Isotachophoretic Method for the Simultaneous Purification of DNA and Protein"

Isotachopheresis is a technique used to separate charged particles by using a discontinuous electrical field to create sharp boundaries between sample constituents. It provided the first demonstration ever reported of a method capable of providing a technical solution to a modular, low-cost, low-power, low-weight sample-preparation device for nucleic acids and proteins. It represents the only single-method approach to universal sample preparation.

**Charles C. Young**, Senior Professional Staff, Ph.D., Penn State Univ., 1991, Biodetection Methods; **Emily E. Seay**, Associate Professional Staff, B.S., Univ. of Maryland, College Park, 2008, Biological Detection; **Terry E. Phillips**, Principal Professional Staff, Ph.D., JHU, 1976, Chemical and Biological Sensing Systems; **Sarah L. Grady** (non-APL staff)

## Excellence in Development



Salvador H. Talisa



Hedi A. Krichene



Keir C. Lauritzen



Cesar A. Lugo



Erica B. Simcoe



Joseph E. Sluz



George G. Vetticad

### For “Digital Array Radar Technology”

Digital array radar technology enables low search frame times required to perform ballistic missile defense and anti-air warfare effectively with the high dynamic range needed to linearly process high levels of clutter return and small targets. This project has developed the knowledge base and capability at APL to provide critical advice to our sponsors on attaining key radar performance goals.

**Salvador H. Talisa**, Principal Professional Staff, Ph.D., Brown Univ., 1982, Digital Radar Technology and Applications; **Hedi A. Krichene**, Associate Professional Staff, M.S., Univ. of Illinois at Urbana–Champaign, 1997, Radar Signal Processing; **Keir C. Lauritzen**, Associate Technical Staff, M.S.,

Univ. of Maryland, 2005, Digital Radar Hardware Technology; **Cesar A. Lugo**, Senior Professional Staff, Ph.D., Georgia Inst. of Technology, 2006, Digital Radar System Modeling; **Erica B. Simcoe**, Associate Professional Staff, M.S., JHU, 2008, RF Design and Development; **Joseph E. Sluz**, Principal Professional Staff, M.S.E.E., JHU, 1995, RF and Microwave Circuit and System Design; **George G. Vetticad**, Engineering Assistant, A.A., Air Force Technical Training College, Bangalore, India, 1958, Digital Beam Formers

## Honorable Mention



Scott E. Wunsch



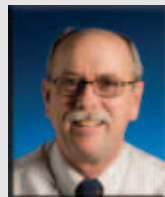
Keith S. Caruso



Artemas P. Herzog



Jeffrey H. Smart



Allen T. Hayes



Jeffrey P. Cullina



W. Lloyd Luedeman

### For “Appliqué Technology for Undersea Warfare”

The U.S. Navy has significant interest in understanding countermeasures to mitigate the vulnerability of exposed masts. However, the enormous dynamic range of water and sky conditions as well as viewing geometries dictate that no single paint scheme can minimize detection. This development and evaluation of innovative concepts

to reduce detectability has provided significant insight to reduce the vulnerability of our submarines.

**Scott E. Wunsch**, Senior Professional Staff, Ph.D., Univ. of Chicago, 1998, Physics; **Keith S. Caruso**, Senior Professional Staff, M.S., JHU, 2002, Mechanical and Materials Engineering; **Artemas P. Herzog**,

Associate Professional Staff, M.S., Ohio State Univ., 2004, Remote Sensing Data Analysis; **Jeffrey H. Smart**, Principal Professional Staff, M.S., Wayne State Univ., 1977, Oceanographic and Environmental Analysis; **Allen T. Hayes**, Associate Professional Staff, A.A., Catonsville Community College, 1972, Mechanical Design and Field Testing; **Jeffrey P. Cullina**, Associate Professional Staff, B.S., Aerospace and Ocean Engineering, Virginia Tech., 1999, Design of Aero/Ocean Systems; **W. Lloyd Luedeman**, Engineering Assistant, Test Hardware

## Honorable Mention



Jeffrey J. Dumm



Michael P. Boyle



Myron Z. Brown



John P. Clancy



Matthew R. Feinstein



Allan R. Jablon



Glenn S. Gealy

### For “High-Fidelity Antenna Pattern Modeling with LIDAR Characterization”

Threat radar antenna patterns can be predicted by applying computational electromagnetic (CEM) computer codes to a three-dimensional physical model of the radar antenna structure. The model is produced from measurements made by high-accuracy Light Detection And Ranging (LIDAR) instrumentation.

**Jeffrey J. Dumm**, Senior Professional Staff, M.S., California State Polytechnic Univ., 1995, Radar Electronic Attack Analysis; **Michael P. Boyle**, Senior Professional Staff, M.S., Univ. of Maryland, 1997, Mechanical Engineering; **Myron Z. Brown**, Senior Professional Staff, M.S., JHU, 2000, LIDAR Signal Processing; **John P. Clancy**, Senior Professional Staff, Ph.D., Indiana Univ., 1999, Signature Modeling and Electronic Warfare; **Matthew R. Feinstein**, Senior Professional Staff, Ph.D., Yale Univ., 1979, Electromagnetic Field Analysis; **Allan R. Jablon**, Senior Professional Staff, M.S., JHU, 1990, Antenna Systems; **Glenn S. Gealy**, Principal Professional Staff, M.S., Physics, Kansas State Univ., 1979, and M.S., Technical Management, JHU, 1990, Electronic Warfare Systems Engineering; **David A. Grunschel** (not pictured), Associate Professional Staff, B.S., Univ. of Illinois at Urbana-Champaign, 2006, Antenna Analysis

## INVENTIONS OF THE YEAR AWARDS FOR 2007



Russell A. Fink

### For “The Passive Forensic Identification of Networked TCP/IP”

This is an innovation that can “fingerprint” the timing characteristics of a networked computer to distinguish it from a group of similar computers by using passively observed timing differences in TCP packets. In a successful first application, the prototype system correlated intercepted network traffic to track a computer that was “hiding” among several machines using the same IP address.

**Russell A. Fink**, Senior Professional Staff, M.S., Univ. of Maryland Univ. College, 1998, Information Assurance



Zaruhi Mnatsakanyan

### For “Bayesian Information Fusion Network”

This technique is designed to reduce false alarms in networked disease-surveillance systems, specifically in the APL-developed Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE) deployed throughout the United States. Information fused from multiple sources is used to determine whether certain statistical anomalies actually indicate an epidemic, automating how an epidemiologist would rule out certain results and conclusions.

**Zaruhi Mnatsakanyan**, Senior Professional Staff, Ph.D., State Engineering Univ. of Armenia, 2000, Heterogeneous Information Fusion, Distributed Information Systems Architectures



Paul Bierman



Craig Leese

### For “Nanotube Battery”

A high-capacity, long-lasting, nanotube battery—thinner than a human hair—is still in early testing. Made primarily from metal or metal oxide, the batteries could find uses in structures, sensors, sensor networks, remote-controlled toys and vehicles, microprocessors, and controllers.

**Paul Bierman**, Principal Professional Staff, B.S., Rensselaer Polytechnic Inst., 1980, Materials and Process Engineering; **Craig Leese**, Engineering Assistant, M.F.A., California State Univ., 1991, Fabricating of Composites and Polymers; **Jeffrey Maranchi**, Senior Professional Staff, Ph.D., Carnegie Mellon Univ., 2004, Materials and Device Development; **Rengaswamy Srinivasan**, Senior Professional Staff, Ph.D., Indian Inst. of Science, 1978, Electrochemistry; **Gary Peck** (non-APL staff)



Jeffrey Maranchi



Rengaswamy Srinivasan