National Academy of Engineering
Induction Ceremonies
October 2, 2022

Classes of 2020, 2021, and 2022
Members and International Members
Class of 2020: Members

In February 2020 the members of the NAE elected 86 new members and 18 new international members. Election to the NAE is one of the highest professional distinctions conferred on engineers. The main criteria for membership in the National Academy of Engineering are outstanding personal contributions and accomplishments in one or both of the following categories:

1. Engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature.
2. Pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education, or providing engineering leadership of major endeavors.

The following pages feature the names, photographs, and election citations of each newly elected member and international member. The numbers following their names denote primary and secondary NAE section affiliations.

Dr. Lilia A. Abron (4)
President and Chief Executive Officer
PEER Consultants, P.C.
For leadership in providing technology-driven sustainable housing and environmental engineering solutions in the United States and South Africa.

Ms. Eleanor J. Allen (4)
Chief Executive Officer
Water for People
For leadership and advocacy in making clean water and sanitation systems accessible to people around the world.

Dr. David J. Allstot (7)
Professor
Electrical Engineering and Computer Science
Oregon State University
For research and commercialization of mixed-mode integrated circuits and systems.

Dr. Robert O. Ambrose (10, 5)
J. Mike Walker ’66 Chair in Mechanical Engineering and Director for Space and Robotics Initiative
Texas A&M University
For advances in dexterous space robotics and leadership in human-robotic teaming in space operations.

Dr. Saeed D. Barbat (10)
Executive Technical Leader Safety, Policy, and Vehicle Analytical Tools
Ford Motor Company
For leadership in automotive safety and contributions to the science of crashworthiness, occupant protection, and biomechanics.

Dr. Peter J. Basser (2)
NIH Senior Investigator
Section on Quantitative Imaging & Tissue Sciences
National Institutes of Health
For development of diffusion tensor MRI and streamline tractography, transforming the characterization of brain disorders and visualization of nerve fiber pathways.

Dr. Barbara A. Bekins (11)
Research Hydrologist
U.S. Geological Survey - Reston
For contributions to characterizing subsurface microbial populations related to contaminant degradation.

Professor Stacey F. Bent (3, 9)
Jagdeep and Roshni Singh Professor of Engineering
Department of Chemical Engineering
Stanford University
For contributions to materials surface chemistry and its application across technology platforms from energy to electronics.
Dr. Thomas A. Berson (5)
Advisory Board Member
Salesforce
For contributions to cybersecurity in the commercial and intelligence communities.

Professor Graham V. Candler (1)
McKnight Presidential Chair
Aerospace Engineering and Mechanics
University of Minnesota
For development and validation of computational models for high-fidelity simulation of supersonic and hypersonic interactions.

Dr. Stephan Biller (8, 5)
Professor
Industrial Engineering & Krannert Business School
Purdue University
For leadership and advancement of manufacturing technologies and innovations based on the Internet of Things and digital data.

Dr. Reginald DesRoches (4)
President
Rice University
For research and design of resilient infrastructure systems to mitigate damage from natural disasters and other extreme conditions.

The Honorable Charles F. Bolden, Jr. (1, 12)
Founder & Chief Executive Officer Emeritus
The Charles F. Bolden Group LLC
For leadership and development of US human spaceflight and space operations programs, and for revitalizing fundamental aeronautics research.

Dr. Joel S. Emer (5)
Senior Distinguished Research Scientist
Nvidia
For quantitative analysis of computer architecture and its application to architectural innovation in commercial microprocessors.

Dr. Alison K. Brown (1, 7)
Founder, President and Chief Executive Officer
NAVSYS Corporation
For contributions to research and development of precision navigation and timing technologies.

Dr. Horacio D. Espinosa (10, 2)
James and Nancy Farley Professor of Manufacturing and Entrepreneurship
Mechanical Engineering Department
Northwestern University - Evanston
For contributions bridging nanoscale experimentation and atomistic simulations.

Professor Marilyn A. Brown (6)
Chair
School of Public Policy
Georgia Institute of Technology
For bridging engineering, social and behavioral sciences, and policy studies to achieve cleaner electric energy.

Dr. John C.C. Fan (9, 7)
Founder, Chairman, Chief Executive Officer, and President
Kopin Corporation
For innovation and entrepreneurship in electronic materials and devices for displays.
Class of 2020: Members

**Dr. Margaret M. Faul (3)**
Vice President
Manufacturing & Clinical Supply and ATO Operations
Amgen, Inc.

For technical leadership in the development of marketed medicines and leadership in enabling technologies, pharmaceutical standards, green chemistry, and sustainability.

**Mr. Eric Gebhardt (6, 8)**
Executive Vice President and Chief Technology Officer
Wabtec Corporation

For development and utilization of advanced electric generation technologies including gas and wind turbines.

**Mr. Karl N. Fleming (6)**
President
KNF Consulting Services LLC

For contributions to probabilistic risk assessment methods and their application to enhance the safety of nuclear power facilities.

**Dr. Thomas R. Giallorenzi (7, 12)**
Senior Fellow
L3 Harris Technologies

For innovation and entrepreneurship in civilian and military communication networks and systems.

**Mr. Gene A. Frantz (7)**
Co-Founder and Former Chief Technical Officer
Octavo Systems, LLC

For leadership in the development and commercialization of digital signal microprocessors.

**Dr. Robert B. Gilbert (4)**
Professor and Department Chair
Department of Civil, Architectural and Environmental Engineering
The University of Texas at Austin

For advancing the use of reliability analyses, risk assessment, and risk-based decision making for complex engineering projects.

**Mr. Paul L. Freedman (4)**
Chief Executive Officer
LimnoTech

For development and application of science-based computer models for water body and watershed assessment, remediation, and management.

**Dr. Kenneth E. Goodson (10)**
Davies Family Provostial Professor and Senior Associate Dean
School of Engineering
Stanford University

For developments in microprocessor thermal management and nanoscale heat conduction.

**Dr. Rajeev Gautam (3)**
President and Chief Executive Officer (Retired)
Honeywell Performance Materials and Technologies

For business and technical leadership in the oil, gas, and petrochemicals industry.

**Professor Kenneth C. Hall (1, 10)**
Julian Francis Abele Professor
Department of Mechanical Engineering and Materials Science
Duke University

For development of unsteady aerodynamic and aeromechanics theories and analysis for internal and external aerodynamic flows.
Dr. Vicki L. Hanson (5)
Executive Director and Chief Executive Officer
Association for Computing Machinery

For contributions to the design of accessible systems and for leadership in the computer science and engineering community.

Dr. Omar Ishrak (2)
Chairman and Chief Executive Officer
Medtronic, Inc.

For contributions to diagnostic ultrasound and for leadership in medical technology innovation and globalization.

Dr. Latonia M. Harris (2, 3)
Scientific Director - CMC Leader Janssen R&D Portfolio Management
Janssen Pharmaceutical

For leadership in biomanufacturing of a breakthrough immunotherapy biotherapeutic and for outreach activities in STEM education.

Dr. Dana K. Jackson (1)
Senior Vice President and General Manager
MITRE National Security Sector

For developing human and technological aerospace capabilities for national security and for promoting global technology cooperation.

Lt. General Susan J. Helms (1)
Principal and Owner
Orbital Visions LLC

For accomplishments in civil and military space programs.

Dr. Mrdjan Jankovic (10, 7)
Senior Technical Leader Ford Research and Advanced Engineering
Ford Motor Company

For contributions to nonlinear control theory and automotive technology.

Dr. Susanne V. Hering (12)
President
Aerosol Dynamics, Inc.

For advances and commercialization in aerosol measurements and instrumentation.

Dr. Sallie A. Keller (8, 12)
Distinguished Professor of Biocomplexity
Biocomplexity Institute & Initiative
University of Virginia

For development and application of engineering and statistical techniques in support of national security and industry.

Dr. Susan S. Hubbard (11, 12)
Deputy Laboratory Director for Science and Technology
Oak Ridge National Laboratory

For contributions to hydrogeophysics and biogeophysics and the geophysics of permafrost.

Professor Ioannis G. Kevrekidis (3)
Bloomberg Distinguished Professor
Johns Hopkins University

For research on multiscale mathematical modeling and scientific computation for complex, nonlinear reaction, and transport processes.
Mr. Ron Klemencic (4)
Chairman and Chief Executive Officer
Magnusson Klemencic Associates, Inc.
For innovation in the design of high-rise buildings worldwide and for research and design guidelines to advance structural engineering practices.

Dr. Tamara G. Kolda (5, 8)
Independent Researcher and Consultant
MathSci.ai
For contributions to the design of scientific software, including tensor decompositions and multilinear algebra.

Professor Julia A. Kornfield (3, 9)
Elizabeth W. Gilloon Professor of Chemical Engineering
Division of Chemistry and Chemical Engineering
California Institute of Technology
For developing megasupramolecules for antimisting fuel additives and light-adjustable intraocular lenses to improve cataract surgery outcomes.

Dr. Paul E. Krajewski (9)
Director
Vehicle Systems Laboratory
General Motors Research Laboratories
For development and implementation of lightweight automotive materials.

Dr. Thomas R. Kurfess (8, 10)
Distinguished Professor
Mechanical Engineering
Georgia Institute of Technology
For development and implementation of innovative digital manufacturing technologies and system architectures.

Dr. James F. Kurose (5)
Distinguished Professor
College of Information and Computer Science
University of Massachusetts Amherst
For contributions to the design and analysis of network protocols for multimedia communication.

Professor Sarah Kurtz (9, 6)
Professor
University of California, Merced
For contributions to the development of GaInP/GaAs photovoltaic cells and leadership in solar cell reliability and quality.

Mr. Mark G. Lauby (6)
Senior Vice President and Chief Engineer
North American Electric Reliability Corporation
For the development and application of techniques for electric grid reliability analysis.

Professor Steven L. Kramer (4)
Professor Emeritus
University of Washington
For contributions to geotechnical earthquake engineering, including liquefaction, seismic stability, and seismic site response.

Professor Fei-Fei Li (5)
Professor, Computer Science Department
Co-Director of Stanford Institute of Human-Centered AI (HAI)
Stanford University
For contributions in building large knowledge bases for machine learning and visual understanding.
Dr. Eugene Litvinov (6)
Chief Technologist Business Architecture and Technology
ISO New England
For development of optimization mathematics for new electricity markets and innovative applications for electric grid control, visualization, and planning.

Dr. Chen-Ching Liu (6)
American Electric Power Professor Director, Power and Energy Center
Electrical and Computer Engineering
Virginia Tech
For contributions to computational methods for power system restoration and cybersecurity.

Dr. Susan S. Margulies (2)
Assistant Director
Directorate of Engineering
National Science Foundation
For elaborating the traumatic injury thresholds of brain and lung in terms of structure-function mechanisms.

Professor Thomas L. Marzetta (7)
Distinguished Industry Professor Electrical and Computer Engineering
New York University Tandon School of Engineering
For contributions to massive multiple-input multiple-output antenna arrays in wireless communications.

Dr. Paul F. McKenzie (3, 2)
Chief Operating Officer
CSL Behring
For delivering breakthrough medicines, modernizing process development and manufacturing, and integrating modern engineering concepts in pharmaceutical industries.

Professor Muriel Médard (7)
Cecil H. Green Professor
Electrical Engineering and Computer Science
Massachusetts Institute of Technology
For contributions to the theory and practice of network coding.

Dr. Leilio H. Mejia (4)
Senior Principal
Geosyntec Consultants
For the evaluation, design, and construction of embankment dams and foundation systems and contributions to geotechnical earthquake engineering.

Dr. Russell D. Meller (8)
Principal Scientist
Science & Technology
Fortna, Inc.
For contributions to large-scale distribution center design and operation.

Professor James A. Momoh (6, 5)
Chairman and Chief Executive Officer
Nigerian Electricity Regulatory Commission (NERC)
For the development of electric grid optimization techniques and implementation of advanced technology and policy for emerging electric grids in Africa.

Professor Paulo J. Monteiro (4, 9)
Professor
Civil and Environmental Engineering
University of California, Berkeley
For contributions to the science and nanotechnology of concrete for sustainable construction and durable structures.
### Class of 2020: Members

**Dr. Jayathi Y. Murthy (10)**  
Ronald and Valerie Sugar Dean and Distinguished Professor  
School of Engineering & Applied Science  
University of California, Los Angeles  
For the development of unstructured solution-adaptive finite volume methods for heat, mass, and momentum transport.

**Dr. Per F. Peterson (6, 10)**  
Floyd Distinguished Professor of Engineering  
Department of Nuclear Engineering  
University of California, Berkeley  
For experimental and analytical research contributions for the design and development of passive safety systems for advanced nuclear reactors.

**Dr. Laura E. Niklason (2)**  
Founder, President & Chief Executive Officer  
Humacyte Inc.  
For cardiovascular tissue engineering, lung regeneration, and biomedical imaging.

**Dr. Francisco F. Roberto (11, 12)**  
Director, Processing Technology and Innovation  
Technical Services Processing and Metallurgy  
Malozemoff Technical Facility  
Newmont Mining Corporation  
For advancing biotechnical applications for environmentally responsible mine production.

**Dr. Jorge Nocedal (8, 5)**  
Walter P. Murphy Professor  
Northwestern University - Evanston  
For contributions to the theory, design, and implementation of optimization algorithms and machine learning software.

**Dr. Anne K. Roby (3)**  
Executive Vice President (Retired)  
Linde, PLC  
For developments in oxidation processes and leadership in technological developments, safety, and business growth in global industrial gas companies.

**Dr. Ellen Ochoa (12)**  
Center Director, Astronaut (Retired)  
NASA Johnson Space Center  
For service as an astronaut, a technical leader in government, and an optical scientist/engineer.

**Dr. Ahmadreza Rofougaran (7)**  
Co-Chief Executive Officer, Chief Technology Officer & Co-Founder  
Movandi Corporation  
For the development of radio system-on-a-chip technology for wireless networking.

**Ms. Sara N. Ortwein (11)**  
Former President, XTO Energy  
Exxon Mobil Corporation  
For engineering leadership in the upstream sector of the oil and gas industry.

**Mr. Mark E. Russell (7)**  
Corporate Vice President Engineering, Technology and Mission Assurance  
Raytheon Company  
For leadership in developing radar systems for enhanced national security and safety.
Class of 2020: Members

**Dr. Amarpreet S. Sawhney (2, 3)**
Chairman and Chief Executive Officer
Instylla Inc.
For development of innovative medical devices that have impacted millions of patients.

**Professor Alexander Shapiro (8)**
A. Russell Chandler III Chair and Professor
School of Industrial and Systems Engineering
Georgia Institute of Technology
For contributions to the theory, computation, and application of stochastic programming.

**Dr. Peter W. Shor (5)**
Morss Professor of Applied Mathematics
Department of Mathematics
Massachusetts Institute of Technology
For pioneering contributions to quantum computation.

**Ms. Gwynne E. Shotwell (1)**
President and Chief Operating Officer
SpaceX
For bringing affordable, commercially competitive space transportation to NASA and the US National Security Space Launch.

**Dr. Nancy R. Sottos (10, 9)**
Swanlund Endowed Chair and Department Head
Materials Science and Engineering
University of Illinois at Urbana-Champaign
For contributions to the design and applications of self-healing and multifunctional materials.

**Dr. Michael A. Sutton (10)**
Carolina Distinguished Professor Emeritus
Mechanical Engineering College of Engineering and Computing
University of South Carolina
For creation of digital image correlation-based measurement technology and its dissemination through commercialization and applications in industry.

**Professor Maria C. Tamargo (9)**
Professor Physical Chemistry and Inorganic Chemistry
City College of New York
For forging the way toward an inclusive science and engineering research community and for contributions to molecular-beam epitaxy of semiconductor materials.

**Dr. Mark E. Thompson (9, 3)**
Professor of Chemistry and Materials Science
University of Southern California
For development of highly efficient electrophosphorescent materials for organic light emitting devices used in displays and lighting worldwide.

**Dr. Rudolf M. Tromp (9)**
Research Staff Member IBM Research Division
IBM Thomas J. Watson Research Center
For contributions to development and commercialization of nanoscale characterization methods, and their application in materials science.
Class of 2020: Members

**Professor Leung Tsang (12, 7)**
Professor
Electrical Engineering and Computer Science
University of Michigan

For contributions in wave scattering and microwave remote sensing theories for satellite missions.

**Dr. Charles W. Wampler, II (10)**
Senior Technical Fellow
Chemical and Materials Systems Laboratory
General Motors Corporation

For leadership in robotic systems in manufacturing, mathematical methods for robot motion and machine design, and traction battery modeling.

**Dr. Kerry J. Vahala (7)**
Jenkins Professor and Professor of Applied Physics
Applied Physics and Materials Science
California Institute of Technology

For research and application of nonlinear optical microresonators to the miniaturization of precision time and frequency systems.

**Dr. Kenneth E. Washington (12)**
Vice President, Software Engineering
Consumer Robotics
Amazon Web Services

For leadership in nuclear safety, information systems and high-performance computing, space research, and automotive technologies.

**Dr. Richard A. Vaia (9)**
Chief Scientist
Materials and Manufacturing Directorate
Air Force Research Laboratory

For aerospace applications of polymeric nanomaterials and for technical leadership in materials for national defense applications.

**Professor Dick K. Yue (12)**
Philip J. Solondz Professor of Engineering and Professor of Mechanical and Ocean Engineering
Massachusetts Institute of Technology

For contributions to ocean engineering and innovation of OpenCourseWare to make higher education freely available worldwide.

**Dr. Steven H. Walker (1)**
Vice President and Chief Technology Officer
Corporate Engineering, Technology and Operations
Lockheed Martin Corporation


**Dr. Jie Zhang (11, 2)**
Chairman and Chief Scientist
GeoTomo, LLC

For advances in earthquake seismology, geophysical imaging, and medical technology.
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Dr. Eduard Arzt (9)</td>
<td>Scientific Director and Chief Executive Officer and Professor for New Materials</td>
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<td></td>
<td>Leibniz Institute for New Materials (INM) and Saarland University</td>
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<tr>
<td></td>
<td>For research on mechanical properties and development of bio-inspired functional surfaces for medical adhesives and novel gripping systems.</td>
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| Professor Günter Blöschl (4, 12)          | Professor of Hydrology and Water Resources                               |
|                                           | Inst. of Hydraulic Engrg. and Water Resources                            |
|                                           | Vienna University of Technology                                           |
|                                           | For international leadership in the prediction and management of extreme hydrological events. |

| Professor Raffaello D’Andrea (10, 7)      | Professor                                                                  |
|                                           | Department of Mechanical and Process Engineering                           |
|                                           | ETH Zurich                                                                 |
|                                           | For contributions to the design and implementation of distributed automation systems for commercial applications. |

| Dr. Zhonghan J. Deng (7)                  | Co-Founder/Chairman                                                        |
|                                           | Vimicro Group Zhongxing Microelectronics Company Ltd.                     |
|                                           | For development of the world’s first CMOS single-chip web camera and China’s Surveillance Video and Audio Coding (SVAC) national video standard. |

| Dr. Pawan K. Goenka (10, 8)               | Managing Director & Chief Executive Officer                               |
|                                           | Mahindra & Mahindra Ltd.                                                  |
|                                           | For leadership and expansion of Mahindra’s automotive business in India and contributions in automotive engine lubrication. |

| Dr. Daeje Chin (7, 5)                     | Chief Executive Officer                                                   |
|                                           | Skylake Investment Company                                                |
|                                           | For innovations and industry leadership in semiconductor technology.       |

| Professor Susan T. Harrison (11, 3)       | Deputy Vice Chancellor Professor, Chemical Engineering                   |
|                                           | University of Cape Town                                                  |
|                                           | For leadership in biochemical engineering and its application to mining and environmental remediation. |

| Professor Chennupati Jagadish (7, 9)      | Distinguished Professor                                                  |
|                                           | Research School of Physics                                               |
|                                           | Australian National University                                           |
|                                           | For contributions to nanotechnology for optoelectronic devices.          |

| Professor Claudia A. Felser (9, 11)       | Director                                                                 |
|                                           | Solid State Chemistry                                                    |
|                                           | Max Planck Institute for Chemical Physics of Solids                      |
|                                           | For the prediction and discovery of engineered quantum materials ranging from Heusler compounds to topological insulators. |

| Professor Igor Emri (9, 10)                | Chair Professor of Mechanics Faculty of Mechanical Engineering           |
|                                           | University of Ljubljana                                                 |
|                                           | For contributions to the testing and modeling of time-dependent materials, and to novel sound and vibration isolation materials. |
Class of 2020: International Members

Professor Wolfgang Marquardt (3, 5)
Chairman of the Board of Directors
Forschungszentrum Julich GmbH

For contributions to process systems engineering and large-scale computations, and for national leadership in science/technology policy and management.

Professor Roberto Meli Piralla (4)
Research Professor
National Autonomous University of Mexico

For advancing the preservation of historic structures and improving the seismic safety of concrete, masonry, and adobe structures worldwide.

Professor Michael V. Sefton (2, 3)
University Professor
Chemical Engineering & Applied Chemistry
University of Toronto

For advances in biomaterials and tissue engineering through cell microencapsulation and leadership of large-scale research initiatives.

Professor Abigail J. Sellen (5, 12)
Lab Director and Distinguished Scientist
Microsoft Research Cambridge, UK

For contributions that ensure consideration of human capabilities in the design of computer systems.

Professor Essam A. Sharaf (4, 12)
Professor
Cairo University

For leadership to modernize transportation systems in Egypt and the Middle East through scholarship, advocacy, and public policy.

Dr. Guaning Su (12, 7)
President Emeritus
Nanyang Technological University

For contributions to regional security and defense and for academic leadership.

Professor Viola Vogel (2)
Professor
Dept. of Health Sciences and Technology
ETH Zurich

For elucidation of how proteins work as nanoscale mechanochemical switches, and applications to bioengineering and medicine.

Professor Rabab K. Ward (7, 5)
Professor Emeritus Electrical and Computer Engineering
University of British Columbia

For innovative applications of signal processing to industrial and bioengineering problems.
CLASS OF 2020

By Section and Geographic Location
SECTION 1
AEROSPACE ENGINEERING
(PRIMARY SECTION)
Balden, Charles F., Jr.
Brown, Alison K.
Candler, Graham V.
Hall, Kenneth Charles
Helms, Susan Jane
Jackson, Dana Keoki
Shokwell, Carynne E.
Walker, Steven H.

SECTION 2
BIOENGINEERING
(PRIMARY SECTION)
Bauser, Peter Joel
Harris, Latonia M.
Ishak, Omar
Margules, Susan S.
Niklasen, Laura Elizabeth
Sawhney, Amarpreet Singh
Selton, Michael Vivian
Vogel, Viola

SECTION 3
CHEMICAL ENGINEERING
(PRIMARY SECTION)
Bent, Stacey Francine
Paul, Margaret Mary
Gautam, Rajeev
Kevrekidis, Ioannis George
Kornfield, Julia Ann
Marquardt, Wolfgang Hermann
McKenzie, Paul F.
Roby, Anne K.

SECTION 3
CHEMICAL ENGINEERING
(SECONDARY SECTION)
Espinosa, Horacio Dante
McKenzie, Paul F.
Zhang, Jie

SECTION 4
CIVIL & ENVIRONMENTAL ENGINEERING
(PRIMARY SECTION)
Abron, Lilia A.
Allen, Eleanor Juliana Maria
Blosh, Gunter
DesRoches, Reginald
Freedman, Paul L.
Gilbert, Robert B.
Klemencic, Ron
Kramer, Steven L.
Meja, Lelo H.
Mel Picalia, Roberto
Monteiro, Paulo J.M.
Sharaf, Essam Abdel Aziz

SECTION 5
COMPUTER SCIENCE AND ENGINEERING
(PRIMARY SECTION)
Benson, Thomas A.
Emer, Joel S.
Hanson, Vicki Lynne
Kolda, Tamara G.
Kurose, James F.
Li, Fei-Fei
Sellen, Abigail J.
Shor, Peter W.

SECTION 5
COMPUTER SCIENCE AND ENGINEERING
(SECONDARY SECTION)
Ambrose, Robert O.
Billi, Stephan
Chin, Daeye
Marquardt, Wolfgang Hermann
Mommoh, James Adeche
Nocedal, Jorge
Taylor, Russell H.
Ward, Rabab Kreidieh

SECTION 6
ELECTRIC POWER/ENERGY SYSTEMS ENGINEERING
(PRIMARY SECTION)
Brown, Marilyn Ann
Fleming, Karl N.
Gebrhardt, Eric
Luby, Mark G.
Livinev, Eugene
Liu, Chen-Ching
Mommoh, James Adeche
Peterson, Per F.

SECTION 6
ELECTRIC POWER/ENERGY SYSTEMS ENGINEERING
(SECONDARY SECTION)
Kurtz, Sarah

SECTION 7
ELECTRONICS, COMMUNICATIONS & INFORMATION SYSTEMS ENGINEERING
(PRIMARY SECTION)
Aliabot, David J.
Chin, Daeye
Deng, Zhonghan John
Franz, Gene Alan
Gaillorenzi, Thomas Robert
Jagadish, Chennupati
Marzetta, Thomas Louis
Medard, Muriel
Rofougaran, Ahmadreza
Russell, Mark E.
Vahala, Kerry J.
Ward, Rabab Kreidieh

SECTION 7
ELECTRONICS, COMMUNICATIONS & INFORMATION SYSTEMS ENGINEERING
(SECONDARY SECTION)
Bent, Stacey Francine
Jagadish, Chennupati
Kornfield, Julia Ann
Monteiro, Paulo J.M.
Sottos, Nancy R.

SECTION 8
INDUSTRIAL MANUFACTURING, AND OPERATIONAL SYSTEMS ENGINEERING
(PRIMARY SECTION)
Biller, Stephen
Keller, Sallie A.
Kurfess, Thomas R.
Meller, Russell D.
Nocedal, Jorge
Shapiro, Alexander

SECTION 8
INDUSTRIAL MANUFACTURING, AND OPERATIONAL SYSTEMS ENGINEERING
(SECONDARY SECTION)
Smith, John C.
Fedra, Michael

SECTION 9
MATERIALS ENGINEERING
(PRIMARY SECTION)
Arzt, Eduard
Emri, Igor
Fan, John C.C.
Felsler, Claudia Anna-Maria
Krajewski, Paul E.
Kurtz, Sarah
Tamagoo, Maria C.
Thompson, Mark Edward
Tomp, Rudolf Maria
Voit, Richard A.

SECTION 9
MATERIALS ENGINEERING
(SECONDARY SECTION)
Keller, Sallie A.

SECTION 9
MATERIALS ENGINEERING
(SECONDARY SECTION)
D’Andrea, Raffaello

SECTION 10
MECHANICAL ENGINEERING
(PRIMARY SECTION)
Roberto, Francisco F.
Zhang, Jie

SECTION 10
MECHANICAL ENGINEERING
(SECONDARY SECTION)
Bekins, Barbara A.
Harrison, Susan Therese Largier
Hubbard, Susan S.
Ortwine, Sara N.
Roberto, Francisco F.
Zhang, Jie

SECTION 11
EARTH RESOURCES ENGINEERING
(PRIMARY SECTION)
Hering, Susanne V.
Ochoa, Ellen
Su, Guanlin
Taylor, Russell H.
Tsang, Leung
Washington, Kenneth Edward
Yue, Dick K.P.

SECTION 11
EARTH RESOURCES ENGINEERING
(SECONDARY SECTION)
Felsler, Claudia Anna-Maria

SECTION 12
SPECIAL FIELDS AND INTERDISCIPLINARY ENGINEERING
(PRIMARY SECTION)
Sharaf, Essam Abdel Aziz
CALIFORNIA
Beck, Barbara A.
Bent, Stacey Francine
Berson, Thomas A.
Paul, Margaret Mary
Goodson, Kenneth E.
Hering, Susanne V.
Kolda, Tamara G.
Kornfield, Julia Ann
Kurtz, Sarah
Li, Fei-Fei
Meja, Lelio H.
Monteiro, Paulo J.M.
Murthy, Jayathi Y.
Petersen, Per F.
Rofougaran, Ahmadreza
Shotwell, Cwyne E.
Thompson, Mark Edward
Vahala, Kerry J.
Washington, Kenneth Edward

COLORADO
Allen, Eleanor Juliana Maria
Brown, Alison K.
Helms, Susan Jane
Meller, Russell D.
Roberto, Francisco F.

CONNECTICUT
Niklason, Laura Elizabeth
Roby, Anne K.

DISTRICT OF COLUMBIA
Abron, Lilia A.

GEORGIA
Brown, Marilyn Ann
Kurfess, Thomas R.
Lauby, Mark G.
Shapiro, Alexander

IDAHO
Ochoa, Ellen

ILLINOIS
Espinoza, Horacio Dante
Gautam, Rajeev
Nocedal, Jorge
Sottos, Nancy R.

INDIANA
Biller, Stephen

MARYLAND
Basser, Peter Joel
Kevekolds, Ioannis George
Momoh, James Adeche
Taylor, Russell H.
Walker, Steven H.

MASSACHUSETTS
Emen, Joel S.
Fan, John C.C.
Kurose, James F.
Livinov, Eugene
Medard, Muriel
Russell, Mark E.

NEW YORK
Hanson, Vicki Lynne
Marzetta, Thomas Louis
Tamargo, Maria C.
Tromp, Rudolf Maria

OHIO
Vaia, Richard A.

OREGON
Alliot, David J.

PENNSYLVANIA
Harris, Latonia M.
Mckenzie, Paul F.

SOUTH CAROLINA
Hall, Kenneth Charles

SOUTH DAKOTA

TEXAS
Ambrose, Robert O.
DesRoches, Reginald
Frantz, Gene Alan
Gehardt, Eric
Gilbert, Robert B.
Ortwen, Sara N.
Zhang, Jie

UTAH
Giallorenzi, Thomas Robert

VIRGINIA
Bolden, Charles F.
Jackson, Dana Keoki
Keller, Sallie A.
Liu, Chen-Ching
Margolies, Susan S.

WASHINGTON
Fleming, Karl N.
Klemencic, Ron
Kramer, Steven L.

AUSTRALIA
Jagadish, Chennupathi

AUSTRIA
Bloschl, Gunter

CANADA
Sefton, Michael Vivian
Ward, Rabab Kreidieh

CHINA
Deng, Zhonghan John

EGYPT
Sharaf, Essam Abdel Aziz

GERMANY
Arzt, Eduard
Felser, Claudia Anna-Maria
Marquardt, Wolfgang Hermann

INDIA
Goenka, Pawan K.

MEXICO
Meli Piralla, Roberto

SINGAPORE
Su, Guaning

SLOVENIA
Emri, Igor

SOUTH AFRICA
Harrison, Susan Therese Lagier

SOUTH KOREA
Chin, Daeje

SWITZERLAND
D’Andrea, Raffaello
Vogel, Viola

UNITED KINGDOM
Sellen, Abigail
2020 NAE Anniversary Members
50+ YEARS
Members whose names are in boldface type are celebrating their 50th year.

R. Byron Bird
Arthur E. Bryson
John S. Foster, Jr.
Richard J. Grosh
J. Ross Macdonald
William J. Perry

45 TO 49 YEARS
Members whose names are in boldface type are celebrating their 45th year.

Arthur G. Anderson
Stephen D. Bechtel, Jr.
Donald L. Blitzer
Andrew H. Bobeck
Lewis M. Branscomb
Norman H. Brooks
J. Fred Bucy
Malcolm R. Currie
A.J. Field

Robert A. Frosch
Ivar Giaever
James F. Gibbons
Ralph E. Gomory
Roy W. Gould
John C. Hancock
John P. Hirth
Nick Holonyak, Jr.
Arthur E. Humphrey

Robert G. Loewy
Fujio Matsuda
Thomas L. Phillips
Leslie Earl Robertson
Ivan E. Sutherland
Morris Tanenbaum
James G. Wenzel

40 TO 44 YEARS
Members whose names are in boldface type are celebrating their 40th year.

Egil Aberahamsen
H. Norman Abramson
Andreas Acrivos
Clarence R. Allen
John G. Anderson
Alfredo H.S. Ang
Seymour Baron
Wallace B. Behnke
C. Gordon Bell
Daniel Berg
John E. Breen
William B. Bridges
Frederick P. Brooks, Jr.
Jose B. Cruz, Jr.
Robert C. Dean, Jr.
Raymond F. Decker
Anthony J. DeMaria
Leo Esaki
Thomas E. Everhart
Joseph Feinstein

Steven J. Fenves
Merton C. Flemings
Douglas W. Fuerstenaue
Theodore V. Galambos
Robert G. Gallager
William J. Galloway
Richard L. Garwin
Welko E. Gasich
Ronald L. Geer
John B. Goodenough
Stephen E. Harris
Robert W. Hellwarth
Joseph M. Hendrie
Charles L. Hosler, Jr.
Paul C. Jennings
Bernard H. Kear
Leonard Kleinrock
Henri Kogelnik
Henry Kressel
William R. Lucas

Robert W. Lucky
John D. Macenzie
Enrique A. Marcatli
Hans Mark
Robert D. Maurer
John S. Mayo
Perry L. McCarty
William J. McCune, Jr.
Ross E. McKinney

Charles J. McMahon, Jr.
James K. Mitchell
Johannes Moe
Carl L. Monismith
Gordon E. Moore
James J. Morgan
C. Kumar N. Patel
Harold W. Paxton
J. R. Anthony Pearson
Marc J. Pelegian
Karl S. Pister

John M. Prausnitz
Ronald F. Probstein
James R. Rice
Herbert H. Richardson
Theodore Stern
Daniel M. Tellep
Kenneth Thompson
Thomas A. Vanderslice
Andrew J. Viterbi
John B. Wachtman, Jr.
William M. Webster
James Wei
Jasper A. Welch, Jr.
Lloyd R. Welch
Albert C. Westwood
Gerald L. Wilson
Aronon Yariv
Laurence R. Young
2020 NAE Anniversary Members

**35 TO 39 YEARS**

Members whose names are in boldface type are celebrating their 35th year.

Dell K. Allen  
William A. Anders  
Arthur Ashkin  
Norman R. Augustine  
Lionel O. Barthold  
Arden L. Bement, Jr.  
John G. Bollinger  
Klaus D. Bowers  
Alfred Y. Cho  
Anil K. Chopra  
John L. Cleasby  
Philip M. Condit  
Paul M. Cook  
Robert C. Crooke  
James W. Dally  
F. Paul de Mello  
Daniel B. DeBra  
Robert H. Dennard  
James M. Duncan  
Peter S. Eagleson  
Charles A. Eckert  
Richard E. Emmert  
John V. Evans  
G. David Forney, Jr.  
Donald C. Fraser  
Richard J. Goldstein  
Hermann K. Gummel  
Robert S. Hahn  
Kent F. Hansen  
Robert D. Hanson  
Kenneth E. Haughton  
Alfred J. Hendron, Jr.  
Cyril Hilsom  
David A. Hodges  
William G. Howard, Jr.  
John W. Hutchinson  
Erich P. Ippen  
Irwin M. Jacobs  
Trevor O. Jones  
Thomas Kailath  
C. Judson King  
Donald E. Knuth  
James N. Krebs  
Butler W. Lampson  
Ronald M. Latanision  
George Leitmann  
Peter W. Likins  
Raymond C. Loehr  
Dan Luss  
John W. Lyons  
John B. MacChesney  
Sir Robert Malpas  
Carver A. Mead  
Robert Mehrabian  
Richard C. Messinger  
Hyla S. Napadensky  
Sir Robin B. Nicholson  
Thomas K. Perkins  
George P. Peterson  
Lawrence R. Rabiner  
Raj Reddy  
Eli Reshotko  
Stanley T. Rolfe  
Ronald E. Rosensweig  
James F. Roth  
Irwin W. Sandberg  
John H. Schmertmann  
William R. Schowalter  
John H. Seinfeld  
Eugene Sevin  
Charles V. Shank  
Eugene D. Shchukin  
John Brooks Slaughter  
George E. Smith  
Kenneth A. Smith  
Ponisseril Somasundaran  
Nicholas J. Themelis  
Vern W. Weekman, Jr.  
Sheldon Weinig  
Willis S. White, Jr.  
Sheila E. Widnall  
Edward L. Wilson  
Theodore Y. Wu  
Takeo Yokobori  
Dante C. Youla  
Paul Zia
Members whose names are in boldface type are celebrating their 30th year.

Richard C. Alkire
Frank F. Aplan
Minoru S. (Sam) Araki
John A. Armstrong
Michael F. Ashby
Bishnu S. Atal
David H. Auston
William F. Ballhaus, Jr.
Robert G. Bea
George A. Bekey
Alexis T. Bell
John A. Betti
Joel S. Birnbaum
Richard E. Blahut
Kenneth A. Blenkarn
Geoffrey Boothroyd
H. Kent Bowen
Donald A. Brand
Robert W. Brodersen
Robert D. Burnham
Robert L. Byer
James D. Callen
William J. Carroll
John R. Casani
Kenneth E. Case
John F. Cashen
Herbert S. Cheng
Richard M. Christensen
Jon F. Claerbout
Rodney J. Clifton
G. Wayne Clough
James M. Coleman
Harry M. Conner
Robert W. Conn
Lynn A. Conway
Richard A. Conway
Edward J. Cording
Ernest L. Damani
Morton M. Denn
Frederick H. Dill
Stephen W. Director
James J. Duderstadt
Russell D. Dupuis
Lloyd A. Duscha
Robert J. Eaton
James Economy
Charles Elachi
Gerard W. Elverum
Tony F. W. Embleton
Frank F. Fang
Edward A. Feigenbaum
Robert E. Fischell
John W. Fisher
Alan B. Fowler
Judson C. French
Elsa M. Garmire
Jerome B. Gilbert
Alastair M. Glass
George J. Glégihorn
W. Barney Gogarty
Marvin E. Goldstein
Joseph W. Goodman
Arthur C. Gossard
Paul R. Gray
Keith E. Gubbins
Donald L. Hammond
Juris Hartmanis
Michael Hatzakis
Siegfried S. Hecker
Adam Heller
Robert J. Hermann
Arthur H. Heuer
Edward A. Hiler
Narain G. Hingorani
Yu-Chi Ho
Lester A. Hoel
John E. Hopcroft
Izzat M. Idriss
Anthony J. Iorillo
Robert B. Jansen
Marvin E. Jensen
James O. Jirsa
Ellis L. Johnson
Gunter F. Jollik
Frank D. Judge
Robert E. Kahn
Melvin F. Kanninen
Robert E. Kahn
Melvin F. Kanninen
Makoto Kikuchi
Robert H. Kingston
Albert S. Kobayashi
Bernard L. Kof
Louis J. Lanzerotti
Kayde L. Lathrop
Gerald D. Laubach
L. Gary Leal
Norman N. Li
Barbara H. Liskov
John D. Little
Benjamin Y.H. Liu
Daniel P. Loucks
Albert Macovski
Robert F. Mast
James F. Mathis
Shiro Matsuoka
Adolf D. May
John C. McDonald
Chiang C. Mei
David G. Messerschmitt
Keith K. Millheim
Harold Mires
James W. Mitchell
Sanjoy K. Mitter
Joe H. Mize
Joel Moses
C. D. (Dan) Mote, Jr.
Roddam Narasimha
Albert Narath
Stuart O. Nelson
George L. Nemhauser
Arun N. Netravali
J. Nicholas Newman
William D. Nix
Ronald P. Nordgren
J. Tinsley Oden
William G. Oldham
Alan V. Oppenheim
Morton B. Panish
Frank L. Parker
Ronald R. Parker
Bradford W. Parkinson
Donald R. Paul
J. Randolph Paulling
Val P. Peline
Arno A. Penzias
Donald E. Petersen
Dennis J. Picard
R. Byron Pipes
John William Poduska, Sr.
Michael Prats
Edwin P. Przybylowicz
Robert A. Rapp
Jerome G. Rivard
Ronald L. Rivest
Enders A. Robinson
Ignacio Rodriguez-Turbé
Larry A. Rosener
Ronald A. Rohrer
Murray W. Rosenthal
Della M. Roy
Eli Ruckenstein
Elbert L. Rutan
Chih-Tang Sah
Gavriel Salvendy
Alan Schrieke
Frank J. Schuh
Charles D. Scott
Norman R. Scott
Laurence C. Seifert
Don W. Shaw
Michael L. Shuler
Leonard M. Silverman
Merrill I. Skolnik
Henry L. Smith
James A. Solberg
William J. Spencer
Fred I. Stankup
Dale F. Stein
Charles V. Sternling
Richard G. Strauch
William D. Strecker
Ben G. Streetman
John H. Sununu
Chung L. Tang
Byron D. Tapley
Robert E. Tarjan
David A. Thompson
Larry F. Thompson
Charles E. Till
Neil E. Todreas
Jeffrey D. Ullman
Raymond Viskanta
Daniel I. C. Wang
Dianzuo Wang
Kuo K. Wang
William J. Ward, III
Arthur W. Westerberg
John A. White, Jr.
Robert M. White
Janusz S. Wilczynski
Forman A. Williams
James C. Williams
Ward O. Winer
John J. Wise
Eugene Wong
Jerry M. Woodall
David A. Woolhiser
Israel J. Wyganski
Loring A. Wylie, Jr.
Abe M. Zarem
Jacob Ziv
2020 NAE Anniversary Members

25 to 29 years
Members whose names are in boldface type are celebrating their 25th year.

John L. Anderson
John C. Angus
Karl J. Astrom
Arthur B. Baggeroer
Donald W. Bahr
B. Jayant Baliga
Peter M. Banks
Craig R. Barrett
Robert W. Bartlett
Forest Baskett
Leslie A. Benmark
James R. Biard
David T. Blackstock
F. Peter Boer
David B. Bogy
Robert K. Brayton
John D. Bredehoeft
Peter R. Bridenbaugh
Roger W. Brockett
Lord Alec N. Broers
Alan C. Brown
Robert A. Brown
Keith A. Browning
Wilfried H. Brutsaert
Lewis S. (Lonnie) Edelheit
Fredric E. Ehrlich
Jerald L. Erickson
Charles Fairhurst
Odd M. Faltinsen
Eugene J. Fasullo
John E. Flows Williams
Leoey (Mike) M. Fingerson
Bruce A. Finlayson
Fred N. Finn
Essex E. Finney, Jr.
George M.C. Fisher
William L. Fisher
Nancy D. Fitzroy
Edith M. Flanigen
Samuel C. Florman
Hans G. Forsberg
L. B. Freund
William L. Friend
Samuel H. Fuller
B. John Carrick
C. William Gear
Charles M. Geschke
Thomas G. Giallorenzi
Ronald E. Goldsberry
Richard E. Goodman
Bernard M. Gordon
Robert W. Gore
Susan L. Graham
Sidney J. Green
Donald P. Greenberg
Robert W. Gore
Charles T. Haan
George I. Haddad
Gene H. Haertling
Delon Hampton
Niels Hansen
Wesley L. Harris
Howard R. Hart, Jr.
Henry J. Hatch
John L. Hennessy
John A. Herbst
George J. Hess
George J. Hirasaki
Kare Haeg
Stanley H. Horowitz
Thomas J.R. Hughes
Seiunom Inaba
James F. Jackson
David W. Johnson, Jr.
Donald L. Johnson
Anita K. Jones
Paul G. Kaminski
Frank E. Karasz
Richard M. Karp
John C. Kassakian
Susumu Kato
Donald B. Keck
Ralph L. Keeney
Alexander M. Kibarian
Mark H. Kryder
David J. Kuck
Gerald L. Kulcinski
H. T. Kung
Charles R. Karkjian
Richard T. Lahey, Jr.
James L. Lamme
Leslie B. Lamport
Robert S. Langer
Robert C. Laphier, III
Richard C. Larson
George D. Leal
W. John Lee
Sidney Leibovich
Johanna M. H. Levelt Sengers
Robert H. Liebeck
Robert W. MacCormack
Alexander MacLachlan
Thomas L. Magnanti
Thomas J. Malone
Anna M. Marabini
Robert C. Marin
Karl E. Martersteck
Stephen L. Matson
William C. Mauer
Eugene R. McGrath
James C. McIlroy
Jarold A. Meyer
Jerome H. Milgram
Jan D. Miller
Linn F. Mollenauer
L. David Montague
Manfred Morari
William B. Morgan
Norbert R. Morgenstern
Van C. Mow
Richard S. Muller
Earll M. Murman
Venkatesh Narayananurthi
John Neerhout, Jr.
Shlomo P. Neuman
Andrew R. Neureuther
Deborah J. Nightingale
Tak H. Ning
Robert M. Nowak
John H. Nuckolls
James G. O’Connor
Thomas D. O’Rourke
M. Elisabeth Paté-Cornell
David A. Patterson
Judea Pearl
Irene C. Peden
Paul Penfield, Jr.
Alan W. Pense
Stewart D. Personick
Richard H. Petersen
Arun G. Phadke
Nelson L. de S. Pinto
William F. Powers
Richard B. Priory
Robert A. Pucel
W. Harmon Ray
Elsa Reichmanis
John R. Rice
Jose M. Rossel
Donald E. Ross
William B. Rouse
John M. Rowell
Paul E. Rubbert
William B. Russell
Jesse E. Russell
Maxine L. Savitz
Ronald W. Schafer
Jorg Schlaich
Gabriel Schmergel
Ronald V. Schmidt
Jerome S. Schulz
Robert J. Schultz
Lyle H. Schwartz
Micha Schwartz
Charles L. Seitz
Robert J. Serafin
F. Stan Settles
Robert R. Shannon
Hsiieh W. Shen
Thomas B. Sheridan
Jeffrey J. Sirola
Arnold H. Silver
Richard W. Skaggs
Larry L. Smarr
Helmut E. Sobieczky
George S. Springer
Raymond S. Staats
Hermann Statz
Charles R. Steele
Richard J. Stegemeier
Gunter Stein
Richard S. Stein
Robert Stratton
Yasuhide Suematsu
George W. Sutton
2020 NAE Anniversary Members

25 TO 29 YEARS (continued)

Members whose names are in boldface type are celebrating their 25th year.

James M. Symons
Simon M. Sze
Zehev Tadmor
George J. Tamaro
Man-Chung Tang
Richard A. Tapa
Kathleen C. Taylor
Robert L. Taylor
Shoichiro Toyoda
Alvin W. Trivelpiece

R. Rhodes Trussell
Stephen Wei-Lun Tsai
Rao R. Tummala
G. Keith Turnbull
Robert C. Turnbull
Fawwaz Ulaby
Gottfried Ungerboeck
Irv Waaland
Robert H. Wagoner
Steven J. Wallach

Kenneth Walters
C. Michael Walton
Jaw-Kai Wang
John D. Warner
Watt W. Webb
Robert J. Weimer
W. Henry Weinberg
Bernard Widrow
Sheldon M. Wiederhorn
C. Grant Willson

Niklaus Wirth
Savio L-Y. Woo
Edgar S. Woolard, Jr.
Wm. A. Wulf
Henry T. Y. Yang
A. Thomas Young
John A. Young
William D. Young
Zhemin Zheng
Ben T. Zinn
National Academy of Engineering
Induction Ceremony
October 2, 2022

CLASS OF 2021
Members and International Members
In February 2021 the members of the NAE elected 104 new members and 24 new international members. Election to the NAE is one of the highest professional distinctions conferred on engineers. The main criteria for membership in the National Academy of Engineering are outstanding personal contributions and accomplishments in one or both of the following categories:

1. Engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature.
2. Pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education, or providing engineering leadership of major endeavors.

The following pages feature the names, photographs, and election citations of each newly elected member and international member. The numbers following their names denote primary and secondary NAE section affiliations.

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Affiliation</th>
<th>Accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8, 3</td>
<td>Dr. Russell J. Allgor</td>
<td>Amazon</td>
<td>For application of operations engineering to design and improve logistics and fulfillment systems for ecommerce.</td>
</tr>
<tr>
<td>9, 3</td>
<td>Dr. Barry Arkles</td>
<td>Chairperson and Chief Executive Officer, Gelest Inc.</td>
<td>For contributions to organosilicon materials and organometallic and biochemical reagents.</td>
</tr>
<tr>
<td>11</td>
<td>Mr. James R. Arnold</td>
<td>Principal, Taproot Construction, LLC</td>
<td>For commercial application of processes for gold and silver recovery and implementation of advanced environmental controls.</td>
</tr>
<tr>
<td>12, 9</td>
<td>Dr. Santokh S. Badesha</td>
<td>Corporate Fellow &amp; Manager Open Innovation, Xerox Corporation</td>
<td>For developing materials enabling the broad use of laser printing and the creation of color laser printing.</td>
</tr>
<tr>
<td>4</td>
<td>Dr. James L. Barnard</td>
<td>Global Practice and Technology Leader, Black &amp; Veatch</td>
<td>For the development and implementation of biological nutrient removal in water treatment.</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Luiz Andre Barroso</td>
<td>Vice President and Google Fellow, Google, Inc.</td>
<td>For contributions to the architecture, design, and performance of energy-efficient warehouse-scale computing.</td>
</tr>
<tr>
<td>2</td>
<td>Dr. John G. Aunins</td>
<td>Senior Advisor Bioprocess and Manufacturing, Seres Therapeutics, Inc.</td>
<td>For advances in bioprocess engineering, the introduction of new vaccines and development of microbiome-based products.</td>
</tr>
<tr>
<td>12, 11</td>
<td>Dr. James G. Bellingham</td>
<td>Executive Director, Institute for Assured Autonomy, Johns Hopkins University</td>
<td>For design, development, and deployment of autonomous underwater vehicles to advance understanding of the ocean and its resources.</td>
</tr>
</tbody>
</table>
Dr. David Bem (3, 9)  
Chief Technology Officer and Vice President of Science & Technology  
PPG Industries, Inc.

For business leadership and a sustained record of materials discovery to commercialization.

Dr. Zoltan J. Cendes (7)  
Adjunct Professor  
Carnegie Mellon University

For contributions to theory, development, and commercialization of electromagnetics simulation software.

Prof. Christopher N. Bowman (3, 2)  
James and Catherine Patten Endowed Chair and Distinguished Professor  
University of Colorado Boulder

For development of photopolymerization reactions for adaptable polymer networks and their innovative applications.

Ms. Lili Cheng (5)  
Corporate Vice President Conversation AI  
Microsoft Corporation

For scientific and industrial leadership in user interface design, social computing, and computing education.

Dr. Julia J. Brown (7)  
Senior Vice President and Chief Technology Officer  
Universal Display Corporation

For contributions to materials and device technologies for phosphorescent light emitting diode displays, and their commercialization.

Professor James E. Colgate (10, 5)  
Professor  
Mechanical Engineering  
Northwestern University - Evanston

For development of haptic interface technologies, including surface haptics for touchscreens.

Dr. Christopher B. Burke (4)  
Chief Executive Officer  
Christopher B. Burke Engineering, Ltd.

For leadership in executing complex water resources projects and service to the engineering community.

Dr. Lance R. Collins (10, 3)  
Vice President and Executive Director of the Innovation Campus  
Virginia Tech

For contributions to understanding turbulent processes, leadership in engineering, and contributions to the diversity of the profession.

Mr. Carlos A. Cabrera (3, 2)  
Executive Chairman  
Genomatica, Inc.

For leadership in developing and commercializing widely adopted processes for fuels and intermediate chemicals.

Dr. Catherine F. Corrigan (2)  
Chief Executive Officer and President  
Exponent, Inc.

For elucidation of injury mechanisms and mitigation, and leadership in biomechanical engineering and scientific consulting.
Class of 2021: Members

Mr. Erroll B. Davis, Jr. (6)
Board Member
BP, General Motors, PBS and Union Pacific (Retired)
For leadership in research and development of renewable resources integration with the grid, and public education.

Dr. William T. Freeman (5)
Principal Scientist
Google, Inc.
For contributions to computer vision and image enhancement.

Professor Peter J. Delfyett, Jr. (7)
University Distinguished Professor, Pegasus Professor & Trustee Chair
University of Central Florida
For contributions to development and commercialization of low-noise, high-power ultrafast semiconductor lasers.

Professor Andrés J. García (2)
Executive Director & Regent's Professor
Georgia Institute of Technology
For contributions to molecular engineering of biomaterial surfaces and cell adhesion force technology to characterize stem and cancer cells.

Professor Jonathan S. Dordick (2, 3)
Institute Professor
Rensselaer Polytechnic Institute
For contributions to methods for rapidly screening drug efficacy and toxicity, and biocatalytic technologies for improving human health.

Mr. Gary J. Goldberg (11)
Director
BHP Group Limited
For promoting safety, sustainability, inclusion, value, ethics, and responsibility in the mining industry.

Professor Francis J. Doyle, III (2, 3)
John A. & Elizabeth S. Armstrong Professor and Paulson Dean, Engineering & Applied Sciences Harvard University
For insights into natural biological control systems and innovative engineering of diabetes control devices.

Dr. Charles N. Haas (4, 12)
LD Betz Professor of Environmental Engineering
Drexel University
For contributions to quantitative microbial risk assessment for drinking water quality and public health.

Professor Frederick Dryer (10, 1)
Educational Foundation Disting. Research Professor
Mechanical Engineering
University of South Carolina
For contributions to understanding of combustion processes for propulsion and transportation applications and for fire safety.

Dr. Craig J. Hawker (9)
Director of the California NanoSystems Institute
Director of Dow Materials Institute
University of California, Santa Barbara
For contributions to polymer chemistry through synthetic organic chemistry concepts and the advancement of molecular engineering principles.
Mr. Nick Hazen (11, 3)  
President  
Hazen Research, Inc.

For leadership in the commercial development of hydrometallurgical processes for recovering metals from ores.

Professor Mary C. Hill (11, 12)  
Professor of Geology  
University of Kansas

For contributions to development and application of methods for parameter estimation and sensitivity analysis in hydrologic models.

Professor William W. Hogan (8)  
Raymond Plank Professor of Global Energy Policy  
Harvard University

For contributions to electricity industry restructuring, electricity market design, and energy policy modeling and analysis.

Professor Jonathan P. How (1, 5)  
Richard Cockburn MacLaurin Professor  
Massachusetts Institute of Technology

For contributions to decision making and control of intelligent autonomous aerospace vehicles.

Dr. Patrici N. Hurter (3)  
Chief Executive Officer and President  
Lyndra Therapeutics

For leadership in formulation technologies, amorphous dispersions, and continuous processing for hepatitis C and cystic fibrosis treatments.

Professor Marija D. Ilic (6)  
Senior Research Scientist Laboratory for Information and Decision Systems  
Massachusetts Institute of Technology

For contributions to electric power system analysis and control.

Dr. Donald E. Ingber (2)  
Founding Director Judah Folkman Professor of Vascular Biology  
Harvard University

For interdisciplinary contributions to mechanobiology and microsystems engineering, and leadership in biologically inspired engineering.

Dr. Kathryn J. Jackson (6, 12)  
Owner  
Dr. Kathryn Jackson, LLC

For contributions to management of large-scale power system technology, and harmonization of engineering solutions with public policy.

Dr. Hao Huang (6, 1)  
Distinguished Adjunct Professor, Technology Chief  
General Electric Aviation

For contributions to advances in electric machines and power electronics technologies for aerospace electrical systems.

Dr. Christopher T. Jones (1)  
Chief of Operations  
The Leadership Compass

For leadership of defense logistics, sustainment, training, and system readiness in support of US national security.
**Dr. Zakya H. Kafafi (9, 7)**
Distinguished Research Fellow Electrical and Computer Engineering
Lehigh University
For contributions to materials technologies for organic optoelectronics.

**Dr. Witold F. Krajewski (12, 4)**
Rose & Joseph Summers Chair in Water Resources Engineering
The University of Iowa
For advances in flood prediction and mitigation.

**Professor David L. Kaplan (2)**
Stern Family Professor of Engineering and Distinguished University Professor
Tufts University
For contributions to silk-based materials for tissue engineering and regenerative medicine.

**Mr. Roger A. Krone (1, 7)**
Chairman and Chief Executive Officer
Leidos, Inc.
For technical leadership in industry engineering and advances in aerospace and information technology programs.

**Ms. Terri L. Kelly (12)**
Director
United Rentals
For leadership in product development and commercialization by advancing management practices that foster innovation.

**Dr. Rajiv Laroia (7)**
Co-Founder & Chief Technology Officer
Light Labs
For contributions to adaptive multiuser orthogonal frequency division multiplexing for cellular voice and data systems.

**Dr. Thomas F. Kelly (9)**
Founder, President and Chief Executive Officer
Steam Instruments, Inc.
For design and commercialization of the local electrode atom probe to yield 3D atomic-scale analysis of materials.

**Ms. Shelley K. Lavender (1)**
Retired Sr. Vice President, Strike, Surveillance and Mobility, Boeing Defense, Space, and Security
The Boeing Company
For contributions to technological advances of military aircraft platforms and systems.

**Dr. Anne S. Kiremidjian (4, 12)**
Professor
Civil and Environmental Engineering
Stanford University
For research and dissemination of probabilistic seismic hazard methods and mentoring.

**Mr. B. Gentry Lee (1)**
Chief Engineer for Solar System Exploration
Planetary Flight Systems Directorate
Jet Propulsion Laboratory
For contributions to 20 planetary exploration missions to Mars, Jupiter, asteroids, and comets.
Dr. Claire Leon (1, 12)
Director, Space Systems Integration Office
Claire Leon Consulting, LLC
For technical and engineering management of national security space systems.

Dr. Josh Makower (2, 10)
Professor of Medicine and of Bioengineering
Medical Devices / Consumer Healthtech
Stanford University
For inventing balloon sinuplasty, and for leading the commercialization of this and multiple other innovations.

Dr. Frances E. Lockwood (10) Chief Technology Officer (Retired)
Valvoline
For contributions and leadership in the development of sustainable lubricants in automotive and industrial applications.

Mr. James O. Malley (4)
Group Director and Senior Principal
Degenkolb Engineers
For leadership in improving seismic design.

Dr. Azad M. Madni (12, 8)
Chief Executive Officer & Chief Technology Officer
Intelligent Systems Technology, Inc.
For advances in low-cost simulation-based training using interdisciplinary model-based approaches.

Dr. Louis A. Martin-Vega (12, 8)
Professor and Dean of Engineering
North Carolina State University
For support of engineering and engineering education through industry-academic collaboration and opportunities for underrepresented groups.

Mr. William D. Magwood, IV (6)
Director General
Organization for Economic Cooperation and Development
For leadership and contributions to research programs that drive innovation in global nuclear energy enterprises.

Professor Margaret R. Martonosi (5)
Hugh Trumbull Adams ’35 Professor
Princeton University
For contributions to power-aware and power-efficient computer architectures and mobile systems.

Dr. Hani S. Mahmassani (4, 8)
William A. Patterson Distinguished Chair in Transportation & Director, Transportation Center
Northwestern University
For contributions to modeling of intelligent transportation networks and to interdisciplinary collaboration in transportation engineering.

Dr. Marcia K. McNutt (11)
President
National Academy of Sciences
For elucidation of lithosphere geomechanics and leadership in earth resources engineering.
### Class of 2021: Members

<table>
<thead>
<tr>
<th>Ms. Pamela A. Melroy (1)</th>
<th>Professor Oyekunle Olukotun (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Executive Officer</td>
<td>Cadence Design Professor Electrical Engineering and Computer Science Stanford University</td>
</tr>
<tr>
<td>Melroy &amp; Hollett Technology Partners, LLC</td>
<td>For contributions to on-chip multiprocessor architectures and advancement to commercial realization.</td>
</tr>
<tr>
<td><strong>For contributions to human space flight, space access, space situation awareness, and military aeronautics systems.</strong></td>
<td></td>
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<thead>
<tr>
<th>Dr. Danielle W. Merfeld (6)</th>
<th>Professor Mari Ostendorf (5, 7)</th>
</tr>
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<tr>
<td>Vice President &amp; Chief Technology Officer GE Renewable Energy General Electric Company</td>
<td>System Design Methodologies Professor University of Washington</td>
</tr>
<tr>
<td><strong>For leadership and development of products for large wind turbines and solar photovoltaic systems.</strong></td>
<td></td>
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<thead>
<tr>
<th>Dr. Sumita B. Mitra (9)</th>
<th>Dr. Maria Palasis (3)</th>
</tr>
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<tbody>
<tr>
<td>Founder and Partner</td>
<td>President &amp; Chief Executive Officer</td>
</tr>
<tr>
<td>Mitra Chemical Consulting, LLC</td>
<td>Lyra Therapeutics</td>
</tr>
<tr>
<td><strong>For designing and engineering nanomaterials that have revolutionized dental care worldwide.</strong></td>
<td></td>
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<tr>
<th>Mr. Mick C. Mountz (8, 10)</th>
<th>Professor Jong-Shi Pang (8)</th>
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<tr>
<td>Founder &amp; Chief Executive Officer (Retired) Kiva System (now Amazon Robotics)</td>
<td>Epstein Family Chair Professor of Industrial and Systems Engineering University of Southern California</td>
</tr>
<tr>
<td><strong>For advancing industrial mobile robotic material handling systems for order fulfillment.</strong></td>
<td></td>
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<tr>
<th>Dr. Julio A. Navarro (1, 7)</th>
<th>Dr. Mario J. Paniccia (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal Senior Technical Fellow Research and Technology The Boeing Company</td>
<td>Chief Executive Officer Anello Photonics</td>
</tr>
<tr>
<td><strong>For development and implementation of phased array sensors and communication systems for aerospace applications.</strong></td>
<td></td>
</tr>
</tbody>
</table>

| **For contributions to integrated silicon photonic devices and their commercialization.** |
Mr. Glaucio H. Paulino (10, 4)
Margareta E. Augustine Professor
Department of Civil and Environmental Engineering
Princeton University

For contributions to topology optimization and its applications to medicine and engineering.

Professor Laura J. Pyrak-Nolte (11)
Distinguished Professor of Physics and Astronomy
Purdue University

For advances in understanding of the processes that link the mechanical, hydraulic, and seismic properties in discontinuities.

Dr. Fernando C. Pereira (5)
Vice-President and Engineering Fellow
Google, Inc.

For contributions to speech, natural language, and machine learning.

Dr. William A. Radasky (12)
President and Managing Engineer
Metatech Corporation

For leadership in the development and application of electromagnetic transient disturbance and protection standards for national security and commercial systems.

Professor David J. Perreault (6, 7)
Joseph F. and Nancy P. Keithley Professor of Electrical Engineering
Massachusetts Institute of Technology

For contributions to power electronics technology and design techniques for very high frequency energy conversion.

Professor Theodore S. Rappaport (7, 5)
David Lee/Ernst Weber Chaired Professor
New York University Tandon School of Engineering

For contributions to the characterization of radio frequency propagation in millimeter wave bands for cellular communication networks.

Dr. Mark T. Peters (6, 11)
Executive Vice President for National Laboratory
Battelle Memorial Institute

For leadership and contributions in advancing US nuclear energy capabilities and infrastructure.

Dr. Lutgarde M. Raskin (4)
Vernon L. Snoeyink Distinguished University Professor
Altarum/ERM Russell O’Neal Professor of Engineering
University of Michigan

For application of genetic tools to improve anaerobic biological water treatment.

Dr. Joseph B. Powell (3, 12)
Principal
ChemePD LLC

For contributions to process developments in energy, chemicals, and biofuels technologies.

Dr. Peter B. Roemer (2, 7)
GE Healthcare (Retired)

For contributions to performance improvement and widespread availability of MRI technology.
Ms. Jeanne M. Rosario (1, 10)
Former Vice President and General Manager
General Electric Aviation
For leadership in advancing aircraft engine design, global engineering, and support for women in engineering.

Professor J. Marshall Shepherd (12, 11)
Georgia Athletic Association Distinguished Professor and Director
University of Georgia
For development of methods to understand the Earth’s hydrometeorological and hydroclimate system, and for climate science public communication and outreach.

Dr. Krishan K. Sabnani (7, 5)
Homewood Distinguished Professor
Johns Hopkins University
For contributions to software-defined routing and networks.

Professor Winston O. Soboyejo (9)
Senior Vice President and Provost
Worcester Polytechnic Institute
For contributions to understanding dynamic behavior of materials and for leadership in STEM outreach in Africa.

Professor Kamal Sarabandi (12, 7)
Rufus S. Teesdale Endowed Professor of Engineering
University of Michigan
For contributions to the science and technology of radar remote sensing.

Dr. S.V. Sreenivasan (8)
Cockrell Family Regents Chair in Engineering
The University of Texas at Austin
For research, innovation, and entrepreneurship in industrial deployment of nanoimprint lithography equipment.

Mr. Mark P. Sarkisian (4)
Partner
Skidmore Owings and Merrill, LLP
For innovation in efficient and aesthetic design of tall buildings and structures.

Dr. Kathleen J. Stebe (3)
Goodwin Professor,
Applied Sciences & Engineering
University of Pennsylvania
For contributions to understanding of nonequilibrium processes at soft matter interfaces and their impact on new technologies.

Professor Rachel A. Segalman (3, 9)
Department Chair, Chemical Engineering
University of California, Santa Barbara
For contributions to semiconducting block polymers, polymeric ionic liquids, and hybrid thermoelectric materials.

Dr. Yu-Chong Tai (7, 2)
Anna L. Rosen Professor of Electrical Engineering and Medical Engineering
California Institute of Technology
For contributions to microelectromechanical system technologies and parylene-based biomedical microdevices.
Dr. Juming Tang (12)
Regents Professor
Department of Biological Systems Engineering
Washington State University

For invention and commercialization of electromagnetic spectrum wave based food processes.

Professor Jefferson W. Tester (3, 11)
Croll Professor of Sustainable Energy Systems
Cornell University

For leadership in development of novel renewable energy systems.

Dr. Michael M. Thackeray (9)
Argonne Emeritus, Distinguished Fellow and Senior Scientist
Argonne National Laboratory

For invention of cathode materials that dominate in Li-ion batteries for electric vehicles and grid storage.

Professor Levi T. Thompson (3, 9)
Elizabeth Inez Kelley Professor and Dean,
College of Engineering
University of Delaware

For advances in catalysis and energy storage, entrepreneurship, and academic leadership.

Dr. Arthur J. Tipton (2)
Founder and Chief Executive Officer
Vulcan Gray

For the development and commercialization of drug delivery systems, business leadership, and fostering STEM education of disadvantaged students.

Dr. Nikhil C. Trivedi (11, 9)
Senior Partner
Idekin International

For development of minerals processing technologies and mineral products for the paper, polymer, and building industries.

Dr. Hongtei E. Tseng (10, 5)
Senior Technical Leader
Controls & Automated Systems, Research & Advanced Engineering
Ford Motor Company

For contributions to control systems for enhancing vehicle safety.

Ms. Vickie A. VanZandt (6)
President
VanZandt Electric Transmission Consulting, Inc.

For contributions to advanced transmission, protection, and wide area monitoring systems.

Dr. Yurii Vlasov (7, 2)
John Bardeen Endowed Chair
Electrical and Computer Engineering
University of Illinois at Urbana-Champaign

For contributions to development and commercialization of silicon photonics for optical data communications.

Ms. Cindy L. Wallis-Lage (4)
Executive Director and President
Black & Veatch, Engineers-Architects

For applying innovative technology to complex large-scale water infrastructure systems.
**Mr. Christopher J. Wiernicki (12, 4)**
Chairman, President and Chief Executive Officer
ABS

For innovations in the design, engineering, and operation of ships and offshore structures.

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**Professor Donald R. Wilton (7, 5)**
Professor Emeritus
Department of Electrical and Computer Engineering
University of Houston

For contributions to computational electromagnetics of highly complex structures.

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**Dr. Murty V. Yalla (6, 7)**
Vice President & General Manager
Beckwith Electric Co., Inc.

For contributions to digital protection and control devices for the grid.

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**Professor Jackie Y. Ying (2, 3)**
Director & A*STAR Senior Fellow
NanoBio Lab
Agency for Science, Technology and Research (A*STAR)

For contributions at the interface of nanostructured materials, nanomedicine, and diagnostic devices to improve human health.

---

**Dr. Matthew J. Zaluzec (9, 8)**
Professor of Materials Science and Engineering
University of Florida

For innovation of lightweight materials and manufacturing technologies to improve automotive fuel economy and safety and reduce the carbon footprint.
Dr. Takuzo Aida (9, 3)
Professor of Chemistry and Biotechnology
University of Tokyo
For contributions to the engineering of smart and adaptive molecular materials using physical perturbation of multivalent interactions.

Dr. Peter Fratzl (9, 12)
Director, Prof. Dr. Dr. h.c.
Department of Biomaterials
Max Planck Institute of Colloids and Interfaces
For studies of structure and physical properties of biological materials and their application in materials science and medicine.

Dr. AbdulHameed AlHashem (9)
Principal Research Scientist Petroleum Research Center
Kuwait Institute for Scientific Research
For research in support of improved materials for the energy sector, and establishment of atmospheric corrosion maps for Kuwait.

Professor Xiaobing Fu (2)
Professor and Director
Scientific Research Center
General Hospital of PLA
For achievements in elucidating wound healing mechanisms and sweat gland regeneration, and national leadership in clinical management of trauma.

Dr. Paula M. Alves (2)
Chief Executive Officer
iBET, Instituto de Biologia Experimental e Tecnologica
For leadership in biomanufacturing, advanced biotherapeutics, and bridging the gap between academia and industry.

Professor Luis E. Garcia (4)
Honorary Professor
Universidad de Los Andes
For contributions to the earthquake-resistant design, construction, and building code development of concrete structures.

Dr. Giuseppe Bellussi (3)
Senior Vice President (Retired)
Eni S.p.A
For development and commercialization of environmentally beneficial chemical processes.

Dr. Elisabeth L. Guazelli (3, 10)
Senior Researcher
Matiere et Systemes Complexes
CNRS-University of Paris VI
For experiments and theory that enhance understanding of dispersed particulate systems.

Dr. Sebastian Ceria (8)
Chief Executive Officer
Qontigo
For application of optimization tools to advance integer programming and financial engineering.

Dr. Sudhir K. Jain (4)
Director
Indian Institute of Technology Gandhinagar
For leadership in earthquake engineering in developing countries.
Class of 2021: International Members

Dr. Jyeshtharaj B. Joshi (3)
Emeritus Professor of Eminence
University Institute of Chemical Technology (UIC)

For contributions in rational design of multiphase chemical process equipment and leadership in shaping the Indian chemical industry.

Professor Johann W. Kolar (6)
Professor Information Technology and Electrical Engineering
ETH Zurich

For contributions to power-electronic technologies, multiobjective design optimization, education, and technology transfer to industry.

Professor Khaled B. Letaief (7, 5)
Chair Professor & New Bright Professor of Engineering
The Hong Kong University of Science and Technology

For contributions to adaptive resource allocation in multuser orthogonal frequency-division multiplexing wireless systems and for academic leadership.

Professor Alejandro López Valdivieso (11)
Professor Investigador
Instituto de Metalurgia
Universidad Autonoma de San Luis Potosi

For contributions to the processing of complex sulfide ores and educational leadership.

Professor Barbara Sherwood Lollar (11)
University Professor of Earth Sciences
University of Toronto

For contributions to understanding of the evolution of Earth’s groundwater and atmosphere.

Professor Pierre M. Suquet (10)
Distinguished Senior Scientist
Laboratoire de Mecanique et d’Acoustique
CNRS-University of Paris VI

For contributions to the mechanics of nonlinear behavior of heterogeneous viscoplastic solids.

Professor Christofer Toumazou (7, 2)
Regius Professor of Engineering
Imperial College London

For innovations in electronics for medicine, including rapid diagnostics.

Dr. Yoelle Maarek (5)
Vice President of Research
Amazon

For contributions to online information retrieval and data management, and leadership in applied industrial research.

Dr. Marinus A. Van den Brink (12)
President and Chief Technology Officer
ASML

For driving advances in optical and extreme ultraviolet lithography that enable smaller, faster, and more energy-efficient semiconductor devices.
Class of 2021: International Members

**Professor Luc Van den hove (7)**
President & Chief Executive Officer
Interuniversity Microelectronics Center (IMEC)

For leadership in major international industry-university collaborations for the semiconductor industry.

**Professor Wanming Zhai (4, 10)**
Dean of Faculty
Southwest Jiaotong University

For contributions to the design and operation of high-speed rail transportation networks.

---

**Professor Yangsheng Xu (10)**
President
The Chinese University of Hong Kong

For contributions in space robotics and autonomous systems.

**Professor Xiaoxin Zhou (6)**
Honorary President
China Electric Power Research Institute

For contributions to the development and implementation of power systems technology in China.
CLASS OF 2021

By Section and Geographic Location
SECTION 1
AEROSPACE ENGINEERING
(PRIMARY SECTION)
How, Jonathan P.
Jones, Christopher Tyler
Krone, Roger A.
Lavender, Shelley K.
Lee, B. Gentry
Leon, Claire
Melroy, Pamela Ann
Navarro, Julio A.
Rosano, Jeanne M.

SECTION 2
AEROSPACE ENGINEERING
(SECONDARY SECTION)
Tipton, Arthur J.
Simpson, John B.
Roemer, Peter Bernard
Makower, Josh
Kaplan, David L.
Ingber, Donald E.
García, Andrés Jose
Fu, Xiaobing

SECTION 4
CIVIL & ENVIRONMENTAL
ENGINEERING
(PRIMARY SECTION)
Barnard, James L.
Burke, Christopher B.
Garcia, Luis Enrique
Haas, Charles N.
Jain, Sudhir K.
Kiremidjian, Anne Setian
Malley, James O.
Raskin, Lutgarde M.
Sarkissian, Mark Peter
Wallis-Lage, Cindy L.
Zhai, Wanming

SECTION 3
CHEMICAL ENGINEERING
(SECONDARY SECTION)
Aida, Takuzo
Allgor, Russell John
Arkles, Barry
Collins, Lance R.
Dordick, Jonathan S.
Doyle, Francis J., III
Hazan, Nick
Ying, Jackie Y.

SECTION 5
COMPUTER SCIENCE AND
ENGINEERING
(PRIMARY SECTION)
Barroso, Luiz André
Cheng, Lili
Freeman, William T.
Maarek, Yoelle
Martonosi, Margaret R.
Olkotun, Oyekunle
Ostendorf, Mari
Perreira, Fernando C.

SECTION 6
ELECTRIC POWER/ENERGY
SYSTEMS ENGINEERING
(PRIMARY SECTION)
Davis, Erroll Brown, Jr.
Huang, Hao
Ilic, Marija D.
Jackson, Kathryn J.
Kolar, Johann W.
Magwood, William D., IV
Merfeld, Danielle W.
Perreault, David J.
Peters, Mark Todd
VanZandt, Vickie A.
Yalla, Murty V. V. S.
Zhou, Xiaoxin

SECTION 7
ELECTRONICS,
COMMUNICATIONS &
INFORMATION SYSTEMS
ENGINEERING
(PRIMARY SECTION)
Brown, Julia J.
Cendes, Zoltan J.
Delfyett, Peter J., Jr.
Laroca, Rajiv
Letael, Khaled Ben
Paniccia, Mario J.
Rappaport, Theodore Scott
Sabnani, Krishan K.
Tai, Yu-Chong
Toumazou, Christofer
Van den hove, Luc
Vasov, Yuri
Wilton, Donald R.

SECTION 8
INDUSTRIAL,
MANUFACTURING, AND
OPERATIONAL SYSTEMS
ENGINEERING
(SECONDARY SECTION)
Madni, Azad M.
Mahmassani, Hani S.
Martin-Vega, Louis A.
Zalupec, Matthew J.

SECTION 9
MATERIALS ENGINEERING
(PRIMARY SECTION)
Aida, Takuzo
AliHashem, AbdulHameed
Arkles, Barry
Aunins, John Grant
Bem, David

SECTION 10
MECHANICAL
ENGINEERING
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Bellussi, Giuseppe
Bem, David
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Bem, David
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Hutter, Patricia Nell
Joishi, Jyeshtharaj Bhalchandra
Palasis, Maria
Powell, Joseph B.
Segalman, Rachel A.
Stebe, Kathleen J.
Tester, Jefferson W.
Thompson, Levi Theodore

SECTION 10
MECHANICAL
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Guazzelli, Elisabeth Louise Marie
Makower, Josh
Mountz, Mick C.
Rosario, Jeanne M.
Zhai, Wanming

SECTION 7
ELECTRONICS,
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INFORMATION SYSTEMS
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Badesha, Santokhi S.
Bem, David
Segalman, Rachel A.
Thompson, Levi Theodore
Triedi, Nikhil C.

SECTION 10
MECHANICAL
ENGINEERING
(SECONDARY SECTION)
Keria, Michael Makepeace
Zalupec, Matthew J.

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Guazzelli, Elisabeth Louise Marie
Makower, Josh
Mountz, Mick C.
Rosario, Jeanne M.
Zhai, Wanming

CLASS OF 2021: By Section
SECTION 11
EARTH RESOURCES
ENGINEERING
(PRIMARY SECTION)
Arnold, James R.
Goldberg, Gary J.
Hazen, Nick
Hill, Mary Catherine
López Valdivieso, Alejandro
McNutt, Marcia
Pyrak-Nolte, Laura J.
Sherwood Lollar, Barbara
Trivedi, Nikhil C.

SECTION 11
EARTH RESOURCES
ENGINEERING
(SECONDARY SECTION)
Bellingham, James Gladen
Peters, Mark Todd
Shepherd, J. Marshall
Tester, Jefferson W.

SECTION 12
SPECIAL FIELDS AND
INTERDISCIPLINARY
ENGINEERING
(PRIMARY SECTION)
Badesha, Santokh S.
Bellingham, James Gladen
Kelly, Terri L.
Krajewski, Witold F.
Madni, Azad M.
Martin-Vega, Louis A.
Radasky, William A.
Sarabandi, Kamal
Shepherd, J. Marshall
Tang, Juming
Van den Brink, Marinus Aart
Wiernicki, Christopher J.

SECTION 12
SPECIAL FIELDS AND
INTERDISCIPLINARY
ENGINEERING
(SECONDARY SECTION)
Fratzl, Peter
Haas, Charles N.
Hill, Mary Catherine
Jackson, Kathryn J.
Kiremidjian, Aris Setian
Leon, Claire
Powell, Joseph B.
# Class of 2021: By Geographic Location

<table>
<thead>
<tr>
<th>State</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALABAMA</td>
<td>Tipton, Arthur J.</td>
</tr>
<tr>
<td>CALIFORNIA</td>
<td>Barrero, Luiz André Corinian, Catherine Ford Hawk, Craig J</td>
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<td>Kiremidjian, Anne Setian Lee, B. Gentry Leon, Claire Madni, Azad M.</td>
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<td>Makower, Josh Melley, James O. Olukotun, Oyekunle Pang, Jong-Shi</td>
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<td>Paniccia, Mario J. Pereira, Fernando C. Rodsky, William A. Sarksian,</td>
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<td>COLORADO</td>
<td>Bowman, Christopher N. Goldberg, Gary J. Hazen, Nick</td>
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<td>DELAWARE</td>
<td>Kelly, Terri L. Thompson, Lesi Theodore</td>
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<tr>
<td>DISTRICT OF COLUMBIA</td>
<td>McNutt, Marcia</td>
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<tr>
<td>FLORIDA</td>
<td>Candes, Zoltan J. Dellyett, Peter J. Jackson, Kathryn J. Mitra, Surmita</td>
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<td>Roemer, Peter Bernard Yalla, Murty V. V. S. Zaluzec, Matthew J.</td>
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<td>GEORGIA</td>
<td>Davis, Erroll Brown Garcia, Andrés Jose Shepherd, J. Marshall</td>
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<td>ILLINOIS</td>
<td>Burke, Christopher B. Cabrera, Carlos A. Colgate, James Edward</td>
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<td>Mahmassani, Han S. Thackeray, Michael Makepeace Vlasov, Yurii</td>
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<tr>
<td>INDIANA</td>
<td>Pyrack-Nolte, Laura J.</td>
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<tr>
<td>IOWA</td>
<td>Kragowski, Witold F.</td>
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<td>Barnard, James L. Hill, Mary Catherine</td>
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<td>KENTUCKY</td>
<td>Lockwood, Frances E.</td>
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<td>MARYLAND</td>
<td>Bellingham, James Gladon</td>
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<tr>
<td>MASSACHUSETTS</td>
<td>Aunins, John Grant Doyle, Francis J. Freeman, William T. Hogan,</td>
</tr>
<tr>
<td></td>
<td>William Walter How, Jonathan P. Hurter, Patricia Neil Ilic, Marija D.</td>
</tr>
<tr>
<td></td>
<td>Ingber, Donald E. Kaplan, David L. Mountz, Mick C. Palasis, Maria</td>
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<td>Perreault, David J. Soboyejo, Winston Oluwole</td>
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<tr>
<td>MICHIGAN</td>
<td>Raskin, Lutgarde M. Sarabandi, Kamal Tseng, Hongtei Eric</td>
</tr>
<tr>
<td>MISSOURI</td>
<td>Lavender, Shelley K. Walls-Lago, Cindy L.</td>
</tr>
<tr>
<td>NEW JERSEY</td>
<td>Brown, Julia J. Laroia, Rajiv Martinosi, Margaret R. Paulino, Glacio H.</td>
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<td>Sabnani, Krishan K.</td>
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<td>TEXAS</td>
<td>Huang, Hao Powell, Joseph B. Sreenivasan, S. V.</td>
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<tr>
<td>WISCONSIN</td>
<td>Kelly, Thomas F.</td>
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<tr>
<td>BELGIUM</td>
<td>Van den hove, Luc</td>
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<tr>
<td>BRAZIL</td>
<td>Pereira, Mario Veiga Ferraz</td>
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<tr>
<td>CANADA</td>
<td>Shenwood Lollar, Barbara</td>
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<tr>
<td>CHINA</td>
<td>Fu, Xiaobing Xu, Yangsheng Zhai, Wanming Zhou, Xiaoxin</td>
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<tr>
<td>COLOMBIA</td>
<td>Garcia, Luis Enrique</td>
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<td>FRANCE</td>
<td>Guazzelli, Elisabeth Louise Marie Magwood, William D. Suquet, Pierre Marie</td>
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<tr>
<td>GERMANY</td>
<td>Fratzl, Peter</td>
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<tr>
<td>HONG KONG</td>
<td>Letaiief, Khaled Ben</td>
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<tr>
<td>INDIA</td>
<td>Jain, Sudhir K. Joshi, Jyeshtharaj Bhalchandra</td>
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<td>ISRAEL</td>
<td>Maarek, Yoelle</td>
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<td>ITALY</td>
<td>Bellussi, Giuseppe</td>
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<td>JAPAN</td>
<td>Aida, Takuzo</td>
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<tr>
<td>KUWAIT</td>
<td>AlHashem, AbdullHameed</td>
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<td>MEXICO</td>
<td>López Valdivieso, Alejandro</td>
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<td>NETHERLANDS</td>
<td>Van den Brink, Marius Aart</td>
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<tr>
<td>PORTUGAL</td>
<td>Alves, Paula Marques</td>
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<td>SINGAPORE</td>
<td>Ying, Jackie Y.</td>
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<td>SWITZERLAND</td>
<td>Kolar, Johann W.</td>
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<tr>
<td>UNITED KINGDOM</td>
<td>Tournazou, Christofer</td>
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<tr>
<td>NEW YORK</td>
<td>Badesha, Santokh S. Ceria, Sebastian Dordick, Jonathan S Rapaport,</td>
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<td>Theodore Scott Tester, Jefferson W.</td>
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<tr>
<td>NORTH CAROLINA</td>
<td>Martin-Vega, Louis A. Merfeld, Danielle W.</td>
</tr>
<tr>
<td>PENNSYLVANIA</td>
<td>Akriles, Barry Bem, David Haas, Charles N. Stebe, Kathleen J. Trivedi,</td>
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<td>Nikhil C.</td>
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<tr>
<td>SOUTH CAROLINA</td>
<td>Arnold, James R. Dryer, Frederick Rosario, Jeanne M.</td>
</tr>
<tr>
<td>TEXAS</td>
<td>Wiemicki, Christopher J. Wilton, Donald R.</td>
</tr>
</tbody>
</table>
2021 NAE Anniversary Members
50+ YEARS
Members whose names are in boldface type are celebrating their 50th year.

Arthur E. Bryson
John S. Foster, Jr.
Roy W. Gould
Richard J. Grosh
Robert G. Loewy
J. Ross Macdonald
William J. Perry

45 TO 49 YEARS
Members whose names are in boldface type are celebrating their 45th year.

H. Norman Abramson
Alfredo H. Ang
Daniel Berg
Donald L. Bitzer
Andrew H. Bobeck
Lewis M. Branscomb
John E. Breen
Frederick P. Brooks, Jr.
Norman H. Brooks
J. Fred Bucy
Anthony J. DeMaria
Joseph Feinstein
Steven J. Fenves
A.J. Field
Merton C. Flemings
Douglas W. Fuerstenau
Ivar Giaever
James F. Gibbons
Ralph E. Gomory
John B. Goodenough
John C. Hancock
Joseph M. Hendrie
John P. Hirth
Nick Holonyak, Jr.

Arthur E Humphrey
Hans Mark
James K. Mitchell
Gordon E. Moore
Ivan E. Sutherland
Morris Tanenbaum
John B. Wachtman, Jr.
William M. Webster
James G. Wenzel
Amnon Yariv

40 TO 44 YEARS
Members whose names are in boldface type are celebrating their 40th year.

Egil Abrahamsen
Andreas Acrivos
John G. Anderson
Seymour Baron
Lionel O. Barthold
Wallace B. Behlke
C. Gordon Bell
William B. Bridges
Jose B. Cruz, Jr.
Robert C. Dean, Jr.
Daniel B. DeBra
Raymond F. Decker
Leo Esaki
Thomas E. Everhart
Theodore V. Galambos
Robert C. Gallager
William J. Galloway
Richard L. Garwin
Welko E. Gasich
Ronald L. Geer
Stephen E. Harris
Charles L. Hosler, Jr.
Paul C. Jennings
Bernard H. Kear
C. Judson King
Leonard Kleinrock
Donald E. Knuth
Herwig Kogelnik
Henry Kressel
William R. Lucas
Robert W. Lucky
Robert D. Maurer
John S. Mayo
Perry L. McCarry
Ross E. McKinney
Charles J. McMahon, Jr.
Johannes Moe
Carl L. Monismith
C. Kumar N. Patel
J. R. Anthony Pearson
Marc J. Pelegin
Karl S. Pister

Arthur E Humphrey
Hans Mark
James K. Mitchell
Gordon E. Moore
Ivan E. Sutherland
Morris Tanenbaum
John B. Wachtman, Jr.
William M. Webster
James G. Wenzel
Amnon Yariv

Irwin W. Sandberg
Theodore Stern
Kenneth Thompson
Andrew J. Viterbi
James Wei
Jasper A. Welch, Jr.
Lloyd R. Welch
Alberf R. Westwood
Gerald L. Wilson
Takeo Yokobori
2021 NAE Anniversary Members

35 TO 39 YEARS
Members whose names are in boldface type are celebrating their 35th year.

Dell K. Allen
William A. Anders
Norman R. Augustine
Arden L. Bement, Jr.
John G. Bollinger
H. Kent Bowen
Klaus D. Bowers
John F. Cashen
Alfred Y. Cho
Anil K. Chopra
Philip M. Condit
Richard A. Conway
James W. Daily
F. Paul de Mello
Morton M. Denn
Robert H. Dennard
James M. Duncan
Charles A. Eckert
Richard E. Emmert
John V. Evans
Edward A. Feigenbaum
John W. Fisher
G. David Forney, Jr.
Donald C. Fraser
Richard J. Goldstein
Hermann K. Gummel
Robert S. Hahn
Kent F. Hansen
Robert D. Hanson
Kenneth E. Haughton
Alfred J. Hendron, Jr.
Cyril Hilsum
David A. Hodges
William G. Howard, Jr.
John W. Hutchinson
Anthony J. Iorillo
Enich P. Ippen
Irwin M. Jacobs
Robert B. Jansen
Trevor O. Jones
Thomas Kailath
Albert S. Kobayashi
James N. Krebs
Butler W. Lampson
Ronald M. Latanision
Kaye D. Lathrop
George Leitmann
Peter W. Likins
Dan Luss
John W. Lyons
H. Kent Bowen
John F. Cashen
Norman R. Augustine
Arden L. Bement, Jr.
John G. Bollinger
Klaus D. Bowers
H. Kent Bowen
Klaus D. Bowers
John F. Cashen
Alfred Y. Cho
Anil K. Chopra
Philip M. Condit
Richard A. Conway
James W. Daily
F. Paul de Mello
Morton M. Denn
Robert H. Dennard
James M. Duncan
Charles A. Eckert
Richard E. Emmert
John V. Evans
Edward A. Feigenbaum
John W. Fisher
G. David Forney, Jr.
Donald C. Fraser
Richard J. Goldstein
Hermann K. Gummel
Robert S. Hahn
Kent F. Hansen
Robert D. Hanson
Kenneth E. Haughton
Alfred J. Hendron, Jr.
Cyril Hilsum
David A. Hodges
William G. Howard, Jr.
John W. Hutchinson
Anthony J. Iorillo
Enich P. Ippen
Irwin M. Jacobs
Robert B. Jansen
Trevor O. Jones
Thomas Kailath
Albert S. Kobayashi
James N. Krebs
Butler W. Lampson
Ronald M. Latanision
Kaye D. Lathrop
George Leitmann
Peter W. Likins
Dan Luss
John W. Lyons
John B. MacChesney
Robert Malpas
Carver A. Mead
Robert Mehrabian
Chiang C. Mei
Richard C. Messinger
Harold Mires
Joel Moses
Hyla S. Napadensky
George L. Nemhauser
Robin B. Nicholson
William G. Oldham
Morton B. Panish
J. Randolph Paulling
Thomas K. Perkins
George P. Peterson
John W. Poduska, Sr.
Michael Prats
Lawrence R. Rabiner
Raj Reddy
Eli Reshotko
Jerome G. Rivard
Stanley T. Rolfe
Ronald E. Rosenweig
James F. Roth
Chih-Tang Sah
John H. Schmertmann
William R. Schowalter
Charles D. Scott
John H. Seinfeld
Eugene Sevin
Charles V. Shank
Eugene D. Shchukin
Merrill I. Skolnik
John B. Slaughter
George E. Smith
Kenneth A. Smith
Ponisseril Somasundaran
Dale F. Stein
Chung L. Tang
Nickolas J. Themelis
Vern W. Weekman, Jr.
Sheldon Weinig
Willis S. White, Jr.
Sheila E. Widnall
Edward L. Wilson
Theodore Y. Wu
Dante C. Youla
Paul Ziaa
30 TO 34 YEARS
Members whose names are in boldface type are celebrating their 30th year.

Richard C. Allaire
Minoru S. Araki
John A. Armstrong
Michael F. Ashby
Bishnu S. Atal
David H. Auston
Donald W. Bahr
George A. Bekey
Alexis T. Bell
John A. Bettin
James R. Biard
Joel S. Birnbaum
Richard E. Blahut
Kenneth A. Blenkarn
Geoffrey Boothroyd
Donald A. Brand
Roger W. Brockett
Robert W. Brodersen
Robert A. Brown
Robert D. Burnham
Robert L. Byer
James D. Callen
William J. Carroll
John R. Casani
Kenneth E. Case
Steve S. Chen
Herbert S. Cheng
Richard M. Christensen
Jon F. Claerbout
Rodney J. Clifton
G. Wayne Clough
James M. Coleman
Harry M. Conger
Robert W. Conn
Lynn A. Conway
Edward J. Cording
Ernest L. Daman
Frederick H. Dill
Stephen W. Director
James J. Duderstadt
Russell D. Dupuis
Lloyd A. Duschia
Robert W. Dutton
Robert J. Eaton
James Economy
Charles Elachi
Gerard W. Elverum
Charles Fairhurst
Odd M. Faltinsen
Frank F. Fang
Robert E. Fischell
Edith M. Flanigen
Alan B. Fowler
Judson C. French
Samuel H. Fuller
Elsa M. Garmire
Jerome B. Gilbert
Alastar M. Glass
W. Barney Cogarty
Marvin E. Goldstein
Joseph W. Goodman
Richard E. Goodman
Bernard M. Gordon
Arthur C. Gossard
Paul R. Gray
Donald P. Greenberg
Keith E. Gubbins
Donald L. Hammond
Howard R. Hart, Jr.
Juris Hartmannis
Michael Hatzakis
Siegfried S. Hecker
Adam Heller
Robert J. Hermann
Arthur H. Heuer
Edward J. Miller
Narain G. Hingorani
George J. Hirasaki
Yu-Chi Ho
Lester A. Hoel
John E. Hopcroft
Izaz M. Idriis
James F. Jackson
Marvin E. Jensen
James O. Jirsa
Ellis L. Johnson
Gunther F. Jollik
Frank D. Judge
Robert E. Kahn
Melvin E. Kanninen
Frank E. Karaszc
Robert H. Kingston
Bernard L. Koff
David J. Kuck
Leslie B. Lamport
Louis J. Lanzerotti
Gerald D. Laubach
L. Gary Leal
Norman N. Li
Barbara H. Liskov
John D. Little
Benjamin Y. Liu
Daniel P. Loucks
Albert Macovski
Thomas L. Magnanti
Robert C. Marini
Robert F. Mast
James F. Mathis
Shiro Matsuoka
Adolf D. May
John C. McDonald
Eugene R. McGrath
James C. McGroddy
David G. Messerschmitt
Keith K. Millheim
James W. Mitchell
Sanjoy K. Mitter
Joe H. Mize
L. David Montague
C. D. (Dan) Mote, Jr.
Van C. Mow
Earl M. Murman
Albert Narath
Stuart O. Nelson
Arun N. Netravali
J. Nicholas Newman
William D. Nix
Ronald P. Nordgren
J. Tinsley Oden
Alan V. Oppenheim
Frank L. Parker
Ronald R. Parker
Bradford W. Parkinson
Donald R. Paul
Val P. Peline
Arno A. Penzias
Donald E. Peterson
R. Byron Pipes
Edwin P. Przybylowski
Robert A. Rapp
W. Harmon Ray
Ronald L. Rivest
Enders A. Robinson
Ignacio Rodriguez-Iturbe
Larry A. Roesner
Ronald A. Rohrer
Murray W. Rosenthal
William B. Rouse
Elbert L. Rutan
Gavriel Salvendy
Alan Schriesheim
Norman R. Scott
Laurence C. Seifert
Frank S. Settles
Don W. Shaw
Michael L. Shuler
Leonard M. Silverman
Richard W. Skaggs
Henry L. Smith
Helmut E. Sobieczky
James J. Solberg
William J. Spencer
Fred I. Stalkup
Charles V. Sternling
Richard G. Strauch
William D. Strecken
Ben G. Streetman
John H. Sununu
Zehav Tadmor
Byron D. Tapley
Robert E. Tarjan
Robert L. Taylor
David A. Thompson
Larry F. Thompson
Charles E. Till
Neil E. Todreas
Rao R. Tummala
Jeffrey D. Ullman
Raymond Viskanta
Irv Waaland
Dianzuow Wang
Kuo K. Wang
William Ward, III
Arthur W. Westerberg
John A. White, Jr.
Robert M. White
Janusz S. Wilczynski
Forman A. Williams
James C. Williams
Ward O. Winer
Eugene Wong
Jerry M. Woodall
David A. Woodhiser
Israel J. Wygnanski
Loring A. Wyllie, Jr.
Henry T. Yang
John A. Young
Abe M. Zareen
Jacob Ziv
2021 NAE Anniversary Members

25 TO 29 YEARS
Members whose names are in boldface type are celebrating their 25th year.

Leonard M. Adleman
Ronald J. Adrian
John L. Anderson
John C. Angus
Hiroyuki Aoyama
Karl J. Astrom
Satya N. Atluri
Marc A. Auslander
Khalid Aziz
Arthur B. Baggeeroer
B. Jayant Baliga
Peter M. Banks
Craig R. Barrett
Robert W. Bartlett
Forest Baskett
Zdenek P. Bzant
Leslie A. Benmark
Barry W. Boehm
F. Peter Boegy
Lillian C. Borrono
Robert K. Brayton
John D. Bredehoeft
Peter R. Bridenbaugh
Alex N. Broers
Alan C. Brown
Alec N. Broers
Peter R. Bridenbaugh
John D. Bredehoeft
Robert K. Brayton
Lillian C. Borrone
David B. Bogy
F. Peter Boer
Barry W. Boehm
Leslie A. Benmark
Zdenek P. Bzant

2021 NAE Anniversary Members

Paul G. Kaminski
Eugenia Kalnay
John L. Junkins
Anita K. Jones
Donald L. Johnson
David W. Johnson, Jr.
Nikil S. Jayant
Iwao Iwasaki
Akira Ishimaru
Iwao Iwasaki
Nikil S. Jayant
David W. Johnson, Jr.
Donald L. Johnson
Anita K. Jones
John L. Junkins
Eugenia Kalnay
Paul G. Kaminski
Richard M. Karp
John G. Kassakian
Susumu Kato
Donald B. Keck
Ralph L. Keeney
Alexander M. Klabinov
Petar V. Kokotovic
Mark H. Kryder
Gerald L. Kulcinski
H. T. Kung
Charles R. Kulkjian
Richard T. Lahey, Jr.
Bruce M. Lake
James L. Lammie
Robert S. Langer
Robert C. Laphier, III
Richard C. Larson
S. Edward Law
George D. Leal
W. John Lee
Sidney Leibovich
Johanna M. Levitt Sengers
Matthys P. Levy
Robert H. Liebeck
Robert W. MacCormack
Alexander MacLachlan
Thomas J. Malone
Anna M. Marabini
William F. Marcuson, III
Karl E. Martenske
Stephen L. Matson
William C. Maurer
William J. McCloskey
C. Denis Mee
Jarold A. Meyer
Jerome H. Milgram
Jan D. Miller
Warren F. Miller, Jr.
Linn F. Mollenauer
Francis C. Moon
Manfred Morari
William B. Morgan
Norbert R. Morgenstern
Richard S. Muller
Venkatesh Narayanan
John Neerhout, Jr.
Shlomo P. Neuman
Andrew R. Neureuther
Deborah J. Nightingale
Tak H. Ning
Robert M. Nowak
John H. Nuckolls
James G. O’Connor
Thomas D. O’Rourke
Louis C. Parrillo
M. Elisabeth Paté-Cornell
David A. Patterson
Joevea Pearl
Irene C. Peden
Alan W. Pence
Stewart D. Personick
Richard H. Petersen
Arun G. Phadke
Nelson L. Pinto
James D. Plummer
William F. Powers
Richard B. Priory
Robert A. Puce
Michael P. Ramage
H. Donald Ratliff
Elsa Reichmanis
John R. Rice
Jose M. Roesset
Carl H. Rosner
Donald E. Ross
John M. Rowell
Paul E. Rubbert
William B. Rusell
Jesse E. Russell
John M. Samuels, Jr.
Stanley L. Sandler
Maxine L. Savitz
Ronald W. Schafer
Jorg Schneider
Gabriel Schmergel
Ronald V. Schmidt
Jerome S. Schultz
Robert J. Schultz
Lyle H. Schwartz
Misha Schwartz
Charles L. Seitz
Robert J. Serafin
Robert R. Shannon
Hsieh W. Shen
Thomas B. Sheridan
Jeffrey J. Sirola
Arnold H. Silver
Larry L. Smarr
George S. Springer
Karl J. Springer
Raymond S. Staia
Charles R. Steele
Richard J. Stegemeier
Gunter Stein
Robert Stratton
Yasuhiro Sueamatsu
James M. Symons
Simon M. Sze
George J. Tambar
Man-Chung Tang
2021 NAE Anniversary Members

25 TO 29 YEARS (continued)
Members whose names are in boldface type are celebrating their 25th year.

Richard A. Tapia
Kathleen C. Taylor
Lewis M. Terman
Gary L. Tooker
Shoichiro Toyoda
Alvin W. Trivelpiece
R. Rhodes Trussell
Stephen W. Tsai
Richard L. Tucker
G. Keith Turnbull
Robert C. Turnbull
Donald R. Uhlmann
Fawwaz Ulaby
Gottfried Ungerboeck
Andries van Dam
Robert H. Wagoner
Jack L. Walker
Steven J. Wallach
Kenneth Walters
C. Michael Walton
Jay-Kai Wang
John D. Warner
John E. Warnock
Daniel Weils
Sheldon Weinbaum
W. Henry Weinberg
Ward Whitt
Bernard Widrow
C. Grant Willson
Niklaus Wirth
Savio L. Woo
Edgar S. Woolard, Jr.
Wm. A. Wulf
A. Thomas Young
William D. Young
Ben T. Zinn
National Academy of Engineering
Induction Ceremony
October 2, 2022

CLASS OF 2022
Members and International Members
Class of 2022: Members

In February 2022 the members of the NAE elected 111 new members and 22 new international members. Election to the NAE is one of the highest professional distinctions conferred on engineers. The main criteria for membership in the National Academy of Engineering are outstanding personal contributions and accomplishments in one or both of the following categories:

1. Engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature.
2. Pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education, or providing engineering leadership of major endeavors.

The following pages feature the names, photographs, and election citations of each newly elected member and international member. The numbers following their names denote primary and secondary NAE section affiliations.

Mr. Ahmad K. Abdelrazaq (4)
Director, Founding Partner - Rise Global LLC
Former Executive Vice President, Samsung C&T Corp.
For innovation in design, construction, and health monitoring of the world’s tallest and most complex building structures.

Dr. Noubar B. Afeyan (3)
Chief Executive Officer, Flagship Pioneering
Moderna Therapeutics
For leadership in biotechnology, in particular mRNA therapeutics and chromatography.

Dr. Michael V. Arbige (2)
Executive Vice President (Emeritus)
DuPont USA
For leadership in developing and commercializing engineered enzyme products with industrial, consumer, and sustainability benefits.

Ms. MiMi Aung (1)
Director, Technical Program Management
Amazon Kuiper Systems LLC
For development of the NASA Mars Helicopter and the first flight on another planet.

Dr. Anna C. Balazs (9, 3)
John A. Swanson Chair
Chemical and Petroleum Engineering
University of Pittsburgh
For creative and imaginative work in predicting the behavior of soft materials that are composed of multiple cooperatively-interacting components.

Dr. Brian Argrow (1, 12)
Schaden Leadership Professor and Chair
Ann and H. J. Smead Department of Aerospace Engineering
University of Colorado Boulder
For contributions to unmanned aerial systems capable of penetrating severe storms and leadership in their application to scientific observation.

Dr. Richard Baraniuk (7, 12)
C. Sidney Burrus Professor
Electrical and Computer Engineering
Rice University
For the development and broad dissemination of open educational resources and for foundational contributions to compressive sensing.

Ms. Kathleen Bergeron (10)
Vice President
Apple Inc.
For contributions to and leadership in the invention and engineering product realization of innovative designs.
Professor Rena Bizios (2)
Lutcher Brown Endowed Chair Professor
Biomedical Engineering
The University of Texas at San Antonio

For contributions to the theory and applications of cellular tissue engineering, cell/biomaterial interactions, and surface modification biomaterials.

Professor Alan C. Bovik (7)
Cockrell Family Regents Endowed Chair in Engineering and Professor
Electrical and Computer Engineering
The University of Texas at Austin

For contributions to the development of tools for image and video quality assessment.

Dr. Charles R. Bridges, Jr. (2, 5)
Executive Vice President and Chief Scientific Officer
Janssen Research & Development, LLC

For leading the industrial development of new engineered device treatments in the cardiopulmonary space and for pharmaceutical innovation.

Dr. Jian Cao (8, 10)
Cardiss Collins Professor Director, NIMS
Dept. of Mechanical Engng.; Dept. of Civil & Environmental Engng; Dept. of Mat. Sci. & Eng.
Northwestern University - Evanston

For pioneering a flexible sheet forming system and for leadership in manufacturing.

Dr. Paul J. Carter (2)
Genetech Fellow
Antibody Engineering
Genentech

For creating novel approaches to discovering and developing life-saving antibody therapeutics, including bispecific antibodies.

Dr. Robert L. Clark, Jr. (12, 10)
Professor Mechanical Engineering
University of Rochester

For development of automated tools for rapidly identifying and indexing desirable genetic traits for next-generation seed and biotechnology product development.

Ms. Norma B. Clayton (8, 1)
Vice President (Retired)
The Boeing Company

For leadership in transforming manufacturing processes and supply chain management, and for innovative training programs for commercial aerospace industries.

Dr. John M. Cohn (7, 12)
IBM Fellow (Emeritus)
MIT-IBM Watson AI Lab

For improving design productivity of high-performance analog and mixed-signal circuits and for evangelizing STEM education.

Dr. Marian R. Croak (5)
Vice President Engineering Research
Google, LLC

For technical and managerial leadership in the implementation of packet voice networking and for promotion of minority inclusion in engineering.

Dr. Mary Czerwinski (5)
Partner Researcher and Research Manager
Microsoft Research Lab - Redmond

For the application of psychological principles to the design and understanding of human computer interaction.
Class of 2022: Members

Dr. John Davie (12)
Vice President (Retired)
Intel Corporation

For contributions in computer technology to improve education and health care, stimulate economies, and enrich lives throughout underdeveloped countries.

Dr. James J. De Yoreo (9)
Battelle Fellow
Pacific Northwest National Laboratory

For advances in materials synthesis from nucleation to large-scale crystal growth.

Dr. Michael Dettinger (11, 4)
Visiting Researcher
Scripps Institution of Oceanography

For hydroclimate research that significantly enhanced the understanding and management of water resources in the western United States.

Dr. Nancy J. Dudney (9)
Corporate Fellow and Group Leader (Retired)
Oak Ridge National Laboratory

For contributions to the development of high-performance solid-state rechargeable batteries.

Dr. Taher Elgamal (5)
Chief Technology Officer, Security
Salesforce

For contributions to cryptography, e-commerce, and protocols for secure internet transactions.

Dr. Stephen D. Fantone (12)
President and Chief Executive Officer
Optikos Corporation

For contributions to optical engineering and the development of optically-based products and metrology systems.

Ms. Nuria I. Fernandez (4)
Administrator
Federal Transit Administration

For forging innovative strategic partnerships and public policies, and guiding complex transportation planning and operations.

Dr. Craig I. Fields (12)
Former Chairman
U.S. Department of Defense Defense Science Board

For contributions to the development of systems and technology for national security and their transfer to commercial applications.

Ms. Barbara A. Filas (11)
Independent Consulting Engineer

For business leadership, mining engineering achievements, and being a role model especially for young women mining engineers.
Mrs. Denise Gray (10, 6)
President
LG Energy Solution Michigan, Inc. Tech Center
For leadership in the development and production of electronic controls and battery systems for electrified passenger car propulsion system applications.

Mr. Daniel M. Hart (1, 12)
Chief Executive Officer
Virgin Orbit
For engineering leadership in the development and operations of satellites, launch vehicles, missile defense, and national systems.

Dr. Farshid Guilak (2, 10)
Co-Director, Center of Regenerative Medicine
Washington University in St. Louis
For contributions to regenerative medicine and mechanobiology, and their application to the development of clinical therapies.

Professor Youssef M. Hashash (4)
William J. and Elaine F. Hall Endowed Professor
University of Illinois at Urbana-Champaign
For contributions to geotechnical engineering, seismic safety, and the evaluation, design, and construction of underground infrastructure.

Dr. Jerome F. Hajjar (4)
CDM Smith Professor and Chair
Dept. of Civil and Environmental Engineering
Northeastern University
For development of design criteria and models for stability and seismic design of innovative steel and composite structures.

Mr. John D. Hooper (4)
Senior Principal/Director-Earthquake Engineering
Magnusson Klemencic Associates, Inc.
For advancement of building code seismic design provisions and earthquake-resistant structural design of major buildings around the world.

Professor William S. Hammack (12, 3)
William H. and Janet G. Lycan Professor
Chemical and Biomolecular Engineering
University of Illinois at Urbana-Champaign
For innovations in multidisciplinary engineering education, outreach, and service to the profession through development and communication of internet-delivered content.

Mr. Bahman Hoveida (6)
President
Accurant International, LLC
For entrepreneurial leadership in the development of advanced energy management system software for electric utility operations.

Mr. Leonard Harris (11)
President (Retired)
Resource Development, Inc (RDI)
For contributions to the development of mineral resources in Peru and advancing humanitarian programs in associated communities.

Dr. Freeman A. Hrabowski, Ill (12)
President Emeritus
University of Maryland, Baltimore County
For development of a national educational model for students from diverse backgrounds to excel in engineering and science.
Ms. Jill M. Hruby (10)
Under Secretary for Nuclear Security
U.S. Department of Energy
For exceptional service and blazing a trail for women in national security and engineering.

Professor Nola M. Hylton (2)
Professor
Radiology and Biomedical Imaging
University of California, San Francisco
For engineering development and leadership in breast cancer MRI and multicenter national trials, improving the health of millions of women.

Professor Petros Ioannou (12, 7)
A.V. “Bal” Balakrishnan Chair Professor
Ming Hsieh Dept. of Electrical & Computer Eng.
University of Southern California
For contributions to robust adaptive control and intelligent transportation systems for improved traffic flow and driver safety.

Professor Samson A. Jenekhe (3, 9)
Boeing-Martin Professor of Chemical Engineering
University of Washington
For discovery and understanding of conjugated materials for organic light-emitting diodes (OLEDs) widely used in the commercial sector.

Professor Christopher W. Jones (3, 9)
John F. Brock III School Chair and Professor
School of Chemical & Biomolecular Engineering
Georgia Institute of Technology
For contributions to the design and synthesis of catalytic materials and for advancing technologies related to carbon capture and sequestration.

Dr. Waguih S. Ishak (7)
Division Vice President & Chief Technologist
Science & Technology
Corning Research & Development Corporation
For contributions to the design and manufacturing of VCSELs and leadership in establishing their applications.

Dr. Anna Karlin (5)
Bill & Melinda Gates Chair
Paul G. Allen School of Computer Science & Engineering
University of Washington
For contributions to the design and analysis of randomized algorithms and their impact on computer systems and the internet.

Dr. Bahram Jalali (7, 5)
Chair Professor
Electrical and Computer Engineering Department
University of California, Los Angeles
For contributions to silicon photonics, high time-resolution scientific instruments, and biomedical imaging.

Dr. Thomas W. Kenny (7, 10)
Richard W. Weiland Professor
Mechanical Engineering
Stanford University
For the performance enhancement and commercialization of silicon MEMS resonators for timing applications.

Professor George E. Karniadakis (10, 5)
Charles Pitts Robinson and John Palmer Barstow Professor
Brown University
For computational tools, from high-accuracy algorithms to machine learning, and applications to complex flows, stochastic processes, and microfluidics.
Dr. Mladen Kezunovic (6)
Regents Professor & Eugene E. Webb Professor
Texas A&M University
For contributions to automated analysis of power system faults, and leadership in education in protective relaying.

Dr. Rebecca Liebert (3)
Executive Vice President
PPG Industries, Inc.
For leadership in developing and executing innovative initiatives to strengthen the US manufacturing industry.

Dr. Theresa Kotanchek (9, 12)
Chief Executive Officer
Evolved Analytics LLC
For contributions to the development of commercial material products and for facilitating advanced manufacturing technologies.

Dr. Chao-Hsin Lin (10, 1)
Technical Fellow
Environmental Control Systems
The Boeing Company
For the development of aerospace environmental control systems to ensure the safety and well-being of passengers and crew.

Mr. Nicholas D. Lappos (1)
Senior Technical Fellow (Emeritus)
Lockheed Martin Corporation
For improving rotary wing flight performance and serving as test pilot, engineer, inventor, technologist, and business leader.

Ms. Kathryn Lueders (1)
Associate Administrator
Space Operations Mission Directorate
National Aeronautics and Space Administration
For achieving NASA's vision to establish a globally competitive US commercial space sector, yielding new, fully operational space transportation systems.

Professor Marc S. Levoy (5)
VMware Founders Professor (Emeritus)
Stanford University
Vice President and Fellow
Adobe Inc.
For contributions to computer graphics and digital photography.

Dr. Robert J. Madix (3)
Senior Research Fellow
School of Engineering and Applied Science
Harvard University
For development of quantitative models for predicting catalytic selectivity through fundamental understanding of reaction mechanism and kinetics.

Mr. Norman P. Lieberman (3)
Engineering Consultant
Process Chemicals, Inc.
For being the world’s leading developer and teacher of the practical art of troubleshooting chemical and refinery process operations.

Dr. Sandra H. Magnus (1)
Principal
AstroPlanetview, LLC
For national accomplishments in the US civil space program and in Department of Defense engineering and technology integration.
Dr. Ravi V. Mahajan (10)
Intel Fellow
Intel Corporation
For contributions to advanced microelectronics packaging architectures and their thermal management.

Dr. Michele V. Manuel (9)
Professor and Department Chair
Department of Materials Science and Engineering
University of Florida
For contributions to research, implementation, and teaching of computational materials design of biomimetic self-healing metals and high-performance lightweight alloys.

Dr. John C. Mauro (9)
Professor
Materials Science and Engineering
The Pennsylvania State University
For developing and applying data-driven models and machine learning that enable high-strength, damage-resistant glasses.

Mr. John D. McDonald (6)
Smart Grid Business Development Leader
GE Grid Solutions
For leadership in smart grid development and for advancing the professional growth of power system engineers.

Dr. D. Nathan Meehan (11)
President
CMG Petroleum Consulting, Ltd.
For technical and business innovation in the application of horizontal well technology for oil and gas production.

Mr. Sanjay Mehrotra (7)
President & Chief Executive Officer
Micron Technology, Inc.
For contributions to nonvolatile memory design and architecture enabling multilevel cell NAND flash products.

Dr. Michele V. Manuel (9)
Professor and Department Chair
Department of Materials Science and Engineering
University of Florida
For contributions to research, implementation, and teaching of computational materials design of biomimetic self-healing metals and high-performance lightweight alloys.

Dr. Roland J. Menassa (8, 10)
Vice President
Champion Home Builders, Inc.
For contributions to robotics and automation in aerospace, automotive, and e-commerce.

Dr. Paul Mensah (3, 2)
Vice President, Biotherapeutics Pharmaceutical Sciences
Pfizer Inc.
For leadership in accelerating process development of biotherapeutics including the key components for the first approved COVID-19 vaccine.

Mr. Daniel N. Miller (1)
Senior Fellow
Skunk Works
Lockheed Martin Aeronautics Company
For theoretical contributions and practical innovations in flow control that improve the performance of aircraft propulsion systems.

Dr. Stephen G. Monismith (4, 12)
Obayashi Professor in the School of Engineering
Department of Civil and Environmental Engineering
Stanford University
For development of physically-based understanding of freshwater and coastal fluid environments for ecosystem health and sustainable management.
Mr. Elon R. Musk (8)
Founder, Chief Executive Officer and Chief Engineer
SpaceX
For breakthroughs in the design, engineering, manufacturing, and operation of reusable launch vehicles and sustainable transportation and energy systems.

Dr. Farzad Naeim (4)
Founder and President
Farzad Naeim, Inc.
For advancing performance-based seismic design of tall buildings and other structures with instrumentation, isolation, and energy dissipation devices.

Dr. Michael A. Mussallem (2)
Chairman & Chief Executive Officer
Edwards Lifesciences, LLC
For making transcatheter delivery of artificial heart valves possible and saving over 650,000 critically ill patients to date.

Dr. Klara Nahrstedt (7, 5)
Grainger Distinguished Chair in Engineering Computer Science
University of Illinois at Urbana-Champaign
For contributions to managing quality of service in distributed multimedia systems and networks.

Mr. Herbert A. Myers (12)
President
Ag Leader Technologies
For inventing and bringing to market technology that is the foundation of precision agriculture.

Mr. Guy J. Nordenson (4, 12)
Professor
Princeton University
For structural engineering and leadership in promoting structures as art and culture.

Dr. Roger M. Myers (1)
Owner
R. Myers Consulting, LLC
For technical leadership in the development of advanced electrical and chemical space propulsion systems.

Dr. Richard P. O’Neill (8, 6)
Distinguished Senior Fellow
ARPA-Energy
Advanced Research Projects Agency
For leadership and contributions to the liberalization and design of efficient natural gas and electric power markets.

Mr. Satya Nadella (5)
Chairman & Chief Executive Officer
Microsoft Corporation
For advancing corporate computing infrastructure as a cloud service, and for international leadership on sociotechnical systems and practice.

Professor Dani Or (11)
Affiliate Research Professor
Desert Research Institute
For contributions coupling soil physics, hydromechanics, and microbiology through novel measurements, theory, and models of key near-surface hydrologic processes.
**Class of 2022: Members**

**Dr. John W. Palmour (9)**
Chief Technology Officer  
Wolfspeed, Inc.

For development of silicon carbide (SiC)-based advanced electronic devices.

**Ms. Maryann T. Phipps (4)**
President  
Estructure, Inc.

For leadership in structural engineering and contributions to assessment, mitigation, and design of building components for seismic effects.

---

**Dr. Colin J. Parris (8)**
Senior Vice President and Chief Technology Officer  
GE Digital Energy

For leadership and advancement of industrial operational technologies and innovation based on digital data analytics and the Internet of Things.

**Dr. Zorana B. Popovic (7)**
Distinguished Professor  
Lockheed Martin Endowed Chair  
Electrical, Computer and Energy Engineering University of Colorado Boulder

For developing high-efficiency microwave transmitters and active antenna arrays for wireless communication systems and for engineering education.

---

**Dr. Nelson Pedreiro (1, 12)**
Vice President, Advanced Technology Center  
Lockheed Martin Corporation

For technical innovation and engineering leadership on programs of national importance in space exploration, strategic systems, and missile defense.

**Dr. Sarah A. Rajala (12, 7)**
Professor (Emeritus)  
Iowa State University

For innovations in engineering education: outcomes assessment, greater participation and retention of women in engineering, and an enhanced global community.

---

**Dr. Kenneth E. Peters (11)**
Adjunct Professor  
Stanford University

For development and application of geochemistry for basin analysis, hydrocarbon production, and biodegradation metrics.

**Dr. Martin I. Reiman (8, 7)**
Professor  
Industrial Engineering and Operations Research  
Columbia University

For contributions to network theory and applications in large-scale stochastic systems.

---

**Dr. David A. Petti (6)**
Fellow (Emeritus)  
Nuclear Science and Technology  
Idaho National Laboratory

For leadership in the development of high-temperature nuclear reactor fuels and for improving the safety of fission and fusion reactors.

**Dr. David K. Robinson (2)**
Deputy Director  
Vaccine Development and Surveillance  
Bill and Melinda Gates Foundation

For process development innovations and regulatory filings that enabled the worldwide availability of vaccines and novel antibodies.
Professor Nikolaos V. Sahinidis (8, 5)
Gary C. Butler Family Chair and Professor
H. Milton Stewart School of Industrial &
Systems Engineering
Georgia Institute of Technology

For contributions to global optimization and the
development of widely used software for
optimization and machine learning.

Dr. Pradeep Sharma (10, 9)
M.D. Anderson Chair Professor & Department
Chair
University of Houston
For establishing the field of flexoelectricity,
leading to the creation of novel materials and
devices and insights in biophysical phenomena.

Professor Guillermo R. Sapiro (5)
Professor
Rhodes Information Initiative at Duke
Duke University

For contributions to the theory and practice of
imaging.

Dr. Leslie L. Shoemaker (4, 2)
President
Tetra Tech, Inc.
For developing and applying innovative
technology to complex large-scale watershed
management systems and sustainable water
programs.

Professor Julie M. Schoenung (9, 12)
Department Chair and Professor
University of California, Irvine

For innovative and interdisciplinary applications
of materials engineering in trimodal composites,
coatings, additive manufacturing, and green
engineering.

Dr. Deepika B. Singh (8, 9)
Founder and Chief Executive Officer
R&D Investment Holdings, LLC
For manufacturing innovation and
entrepreneurship of Chemical-Mechanical
Planarization (CMP) for wide band-gap
semiconductors and superhard materials-related
products.

Professor Kate M. Scow (11, 12)
Distinguished Professor
University of California, Davis

For elucidating the role of soil microbial
communities in polluted ecosystems and their
responses to agricultural management practices.

Dr. Vijay P. Singh (4, 11)
Distinguished Professor and Regents Professor,
Caroline & William N. Lehrer Distinguished Chair
The University of Texas at El Paso
For contributions to wave modeling and
development of entropy-based theories of
hydrologic processes and hydroclimatic
extremes.

Dr. Manoj R. Shah (6)
Independent Consultant
Rensselaer Polytechnic Institute
For contributions to design, analysis, and electric
machine performance enhancements.

Dr. Daniel Sperling (4, 12)
Professor
Institute of Transportation Studies
University of California, Davis
For leadership and outstanding entrepreneurial
contributions in transportation energy,
advancing alternative energy policies and
promoting government-industry-university
collaborations.
<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Position</th>
<th>Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dr. Leon Thomsen (11, 12)</strong></td>
<td>Chief Scientist, Amoco Production Company</td>
<td>For contributions to seismic anisotropy concepts that produced major advances in subsurface analysis.</td>
</tr>
<tr>
<td><strong>Dr. Michael M. Watkins (1)</strong></td>
<td>Professor of Aerospace and Geophysics, California Institute of Technology</td>
<td>For leadership in the development of space geodesy and leading robotic missions for exploration of the Earth and planetary bodies.</td>
</tr>
<tr>
<td><strong>Dr. Masayoshi Tomizuka (10, 7)</strong></td>
<td>Distinguished Professor, Department of Mechanical Engineering, University of California, Berkeley</td>
<td>For leadership in control of mechanical systems through innovations applied globally in industry, and education of coming generations of leaders.</td>
</tr>
<tr>
<td><strong>Mr. David West (3, 9)</strong></td>
<td>Corporate Fellow, Corporate Technology and Innovation, Saudi Basic Industries Corporation (SABIC)</td>
<td>For solutions to problems with technological, commercial, and societal impacts while advancing chemical sciences by applying reaction engineering fundamentals.</td>
</tr>
<tr>
<td><strong>Professor Franz-Josef Ulm (10, 4)</strong></td>
<td>Professor, Massachusetts Institute of Technology</td>
<td>Contributions to nanoscale improvement of concrete and other materials and structures important for sustainable development of infrastructure and energy resources.</td>
</tr>
<tr>
<td><strong>Dr. Telle Whitney (5)</strong></td>
<td>Chief Executive Officer, Telle Whitney Consulting, LLC</td>
<td>For contributions to structured silicon design and for increasing the participation of women in computing careers.</td>
</tr>
<tr>
<td><strong>Dr. Karen E. Willcox (1, 5)</strong></td>
<td>Director and Professor, Aerospace Engineering and Engineering Mechanics, The University of Texas at Austin</td>
<td>For contributions to computational engineering methods for the design and optimal control of high-dimensional systems with uncertainties.</td>
</tr>
<tr>
<td><strong>Professor Manuela Veloso (5)</strong></td>
<td>Managing Director &amp; Herbert A. Simon, University Professor Emerita, AI Research, JPMorgan Chase &amp; Co.</td>
<td>For contributions to artificial intelligence and its applications in robotics and the financial services industry.</td>
</tr>
<tr>
<td><strong>Ms. Solveig M. Ward (6)</strong></td>
<td>Executive Advisor, Industry Expert, Protection and Automation, Quanta Technology, LLC</td>
<td>For contributions to electric power system protective relaying, and new data communication technologies.</td>
</tr>
<tr>
<td><strong>Dr. Charles E. Wyman (2, 3)</strong></td>
<td>Distinguished Professor, Ford Motor Company Chair in Environmental Engineering, University of California, Riverside</td>
<td>For advances in transforming lignocellulosic feedstocks to low-carbon-footprint fuels and chemicals.</td>
</tr>
</tbody>
</table>
Class of 2022: Members

**Professor Yushan Yan (3)**
Henry B. du Pont Chair  
Chemical and Biomolecular Engineering  
University of Delaware

For creativity, innovation, and entrepreneurship in separation membranes and electrochemical reaction engineering, catalysis, and materials.

**Dr. Taiyin Yang (3, 8)**
Executive Vice President  
Gilead Sciences, Inc.

For the invention, production and global distribution of single tablet regimens for treating HIV.

**Dr. James A. Yurko (9)**
Senior Distinguished Engineer  
Product Design Materials  
Apple Inc.

For innovation, leadership, and the accelerated development of materials applied to consumer electronic products.
Class of 2022: International Members

**Professor Yusuf Altintas (8, 10)**
Professor  
Department of Mechanical Engineering  
University of British Columbia

For contributions to metal-cutting mechanics and machine tool systems research and industry applications.

**Mr. Natarajan Chandrasekaran (5, 6)**
Chairman  
Tata Sons Private, Ltd.

For changing the nature and advancing the capabilities of the software industry in India.

---

**Mr. Juan Andres (2, 8)**
Chief Technical Operations and Quality Officer  
Moderna Therapeutics

For technical leadership in the scale-up and manufacturing of important pharmaceutical products, including the COVID mRNA-1273 vaccine.

---

**Professor Gurumoorthy Bhuvaneswari (6)**
Electrical & Electronics Engineering  
Indian Institute of Technology – Delhi

For contributions to advancement of power converters to improve power quality, and leadership in using advanced technologies for education.

---

**Professor Jerome Faist (7)**
Professor  
Physics  
ETH Zurich (Swiss Federal Institute of Technology)

For contributions to the development of mid-infrared and terahertz quantum cascade lasers.

---

**Professor Nigel P. Brandon (3)**
Dean  
Faculty of Engineering  
Imperial College London

For contributions to the science and engineering of solid oxide fuel cells, and to their technological development and commercialization.

---

**Professor Edwin T. Brown (11, 4)**
Professor Emeritus  
University of Queensland

For advancing understanding of the mechanical behavior of rock masses and application to the design of engineered structures in rock.

---

**Dr. Klaus G. Hoehn (12)**
Vice President  
John Deere Company

For leadership and contributions in product technology and engineering that have advanced precision agriculture and digital farming.

---

**Dr. Peter A. Irwin (4)**
Senior Executive Consultant and Founding Partner  
Rowan Williams Davies & Irwin Inc. (RWDI)

For contributions to wind engineering for the design of tall buildings and long span roofs and bridges.
Dr. Kathrin U. Jansen (2)
Senior Vice President
Head of Vaccine Research & Development
Pfizer Inc.
For leadership in the development of life-saving and commercially successful vaccines against human papilloma virus, pneumococcus, and SARS-CoV-2.

Dr. Ravindra D. Kulkarni (12, 3)
Managing Director
TOM Management
Elkay Chemicals Private Ltd.
For innovation-centric business and technology development and leadership across disciplines.

Professor Wook Hyun Kwon (7)
Professor Emeritus
Electrical and Computer Engineering
Seoul National University
For contributions to model-predictive and robust controls and their commercialization.

Professor Bin Liu (9)
Senior Vice Provost
Department of Chemical & Biomolecular Eng.
National University of Singapore
For bringing organic electronic materials into aqueous media, opening new directions in biomedicine, environmental monitoring, sensors, and electronic devices.

Sir James R. McDonald (12, 6)
Principal & Vice Chancellor
University of Strathclyde
For contributions to engineering leadership and interdisciplinary education, expert power systems, and low-carbon technologies and renewable energy.

Dr. Heike Riel (9, 7)
IBM Fellow, Head Science & Technology
Lead IBM Research Quantum Europe & Africa
IBM Research, Zurich
For global leadership and technical innovations in the semiconductor industry, covering OLED, fundamental device processes, materials, and nanowire devices.

Dr. Byra Na Suresh (1)
Chancellor & Honorary Distinguished Professor
Indian Space Research Organization (ISRO)
For contributions to advances in technologies for space exploration and for leadership to promote peaceful uses of outer space.

Dr. Keh-Chyuan Tsai (4)
Professor
Civil Engineering
National Taiwan University
For international leadership and contributions to earthquake engineering research and design of steel structures.

Professor Rodney S. Tucker (7)
Honorary Laureate Professor (Emeritus)
University of Melbourne
For contributions to semiconductor lasers, high-speed optoelectronics, and energy-efficient optical networking.

Professor Ganapati D. Yadav (3)
National Science Chair (SERB/DST/Govt. of India) & Emeritus Professor of Eminence
Department of Chemical Engineering
Institute of Chemical Technology (ICT) Mumbai
For research, innovation, and education in green chemistry, catalysis, nanotechnology, and chemical engineering leading to clean and green technologies.
Class of 2022: International Members

**Dr. Oz Yilmaz (11, 4)**
Independent Consultant
Anatolian Geophysical

For leadership in developing innovative methods for processing seismic reflection data and educating a generation of geophysicists.

**Dr. Hongjiang Zhang (5, 7)**
Chairman
Beijing Academy of Artificial Intelligence

For technical contributions and leadership in the area of multimedia computing.
CLASS OF 2022
By Section and Geographic Location
SECTION 1
AEROSPACE ENGINEERING
(PRIMARY SECTION)
Argrow, Brian
Aung, MiMi
Hart, Daniel M.
Lappos, Nicholas D.
Lueders, Kathryn
Magnus, Sandra H.
Miller, Daniel N.
Myers, Roger M.
Pedreiro, Nelson
Suresh, Byana Nagappa
Watkins, Michael M.
Willcox, Karen E.

SECTION 1
AEROSPACE ENGINEERING
(SECONDARY SECTION)
Clayton, Norma B.
Lin, Chao-Hsin

SECTION 2
BIOENGINEERING
(PRIMARY SECTION)
Andres, Juan
Arbige, Michael V.
Bixios, Rena
Bridges, Charles R., Jr.
Carter, Paul John
Guilak, Farshid
Hilton, Nola M.
Jansen, Kathrin U.
Mussalem, Michael A.
Robinson, David K.
Wyman, Charles E.

SECTION 2
BIOENGINEERING
(SECONDARY SECTION)
Mensah, Paul
Shoemaker, Leslie L.

SECTION 3
CHEMICAL ENGINEERING
(PRIMARY SECTION)
Aleyan, Noubar B.
Brandon, Nigel Peter
Jenekhe, Samson A.
Jones, Christopher W.
Lieberman, Norman P.
Liebert, Rebecca
Madix, Robert J.
Mensah, Paul
West, David
Yadav, Ganapati D.
Yan, Yushan
Yang, Taiyin

SECTION 3
CHEMICAL ENGINEERING
(SECONDARY SECTION)
Balazs, Anna C.
Hammack, William S.
Kulkarni, Ravindra D.
Wyman, Charles E.

SECTION 4
CIVIL & ENVIRONMENTAL ENGINEERING
(PRIMARY SECTION)
Abdelrazzaq, Ahmad Khalid
Fernandez, Nuna I.
Hajjar, Jerome F.
Hashash, Youssif M.
Hooper, John D.
Irwin, Peter A.
Monismith, Stephen G.
Naem, Farzad
Nordenson, Guy Jérôme Pierre
Phipps, Maryann T.
Shoemaker, Leslie L.
Singh, Vijay P.
Sterling, Daniel
Tsai, Keh-Chyuan

SECTION 4
CIVIL ENGINEERING
(SECONDARY SECTION)
Brown, Edwin Thomas
Dettinger, Michael
Ulm, Franz-Josef
Yilmaz, Oz

SECTION 5
COMPUTER SCIENCE AND ENGINEERING
(PRIMARY SECTION)
Chandrasekaran, Natarajan
Crook, Mariam R.
Czerwinski, Mary
Elgamal, Taher
Karlin, Anna
Levoy, Marc Stewart
Nadella, Satya
Sapiro, Guillermo R.
Veloso, Manuela
Whitney, Telle
Zhang, Hongjiang

SECTION 5
COMPUTER SCIENCE AND ENGINEERING
(SECONDARY SECTION)
Bridges, Charles R., Jr.
Jalali, Bahram
Karniadakis, George Em
Nahosted, Klaa
Popovic, Zorana B.
Tucker, Rodney S.

SECTION 6
ELECTRIC POWER/ENERGY SYSTEMS ENGINEERING
(PRIMARY SECTION)
Bhuvaneswar, Gurumootthu
Howida, Bahman
Kezunovic, Mladen
McDonald, John D.
Petti, David A.
Shaht, Monoj R.
Ward, Solveg Mana

SECTION 6
ELECTRIC POWER/ENERGY SYSTEMS ENGINEERING
(SECONDARY SECTION)
Chandrasekaran, Natarajan
Gray, Denise
McDonald, James Rufus
O’Neill, Richard P.

SECTION 7
ELECTRONICS, COMMUNICATIONS & INFORMATION SYSTEMS ENGINEERING
(PRIMARY SECTION)
Bananiuk, Richard
Book, Alan Conrad
Cohn, John Maxwell
Fast, Jerome
Ishak, Waguhi S.
Jalali, Bahram
Kenny, Thomas W.
Kwon, Woook Hyun
Mehrotra, Sanjay
Nahosted, Klaa
Popovic, Zorana B.
Tucker, Rodney S.

SECTION 7
ELECTRONICS, COMMUNICATIONS & INFORMATION SYSTEMS ENGINEERING
(SECONDARY SECTION)
Ioannou, Petros
Rajala, Sarah A
Reiman, Martin I.
Riel, Heike
Tomizu, Masayoshi
Zhang, Hongjiang

SECTION 8
INDUSTRIAL, MANUFACTURING, AND OPERATIONAL SYSTEMS ENGINEERING
(PRIMARY SECTION)
Altintas, Yusuf
Cao, Jian
Clark, Robert L., Jr.
Guilak, Farshid
Kenny, Thomas W.
Menassa, Roland J.

SECTION 8
INDUSTRIAL, MANUFACTURING, AND OPERATIONAL SYSTEMS ENGINEERING
(SECONDARY SECTION)
Altintas, Yusuf
Cao, Jian
Clark, Robert L., Jr.
Guilak, Farshid
Kenny, Thomas W.
Menassa, Roland J.

SECTION 9
MATERIALS ENGINEERING
(PRIMARY SECTION)
Balazs, Anna C.
De Yoreo, James J.
Dudney, Nancy J.
Kotanchek, Theresa
Liu, Bin
Mauro, Michele V.
Mauro, John Christopher
Palmour, John Williams
Riel, Heike
Schoenung, Julie M
Yurko, James A.

SECTION 9
MATERIALS ENGINEERING
(SECONDARY SECTION)
Jenekhe, Samson A.
Jones, Christopher W.
Sharma, Pradeep
Singh, Deepika B.
West, David

SECTION 10
MECHANICAL ENGINEERING
(PRIMARY SECTION)
Bergeron, Kathleen
Fang, Daining
Gray, Denise
Huby, Jill Marie
Karniadakis, George Em
Lin, Chao-Hsin
Mahajan, Ravi Vimal
Sharma, Pradeep
Tomizu, Masayoshi
Ulm, Franz-Josef

SECTION 10
MECHANICAL ENGINEERING
(SECONDARY SECTION)
Altintas, Yusuf
Cao, Jian
Clark, Robert L., Jr.
Guilak, Farshid
Kenny, Thomas W.
Menassa, Roland J.

SECTION 11
EARTH RESOURCES ENGINEERING
(PRIMARY SECTION)
Brown, Edwin Thomas
Dettinger, Michael
Durlensky, Louis
Filas, Barbara A.
Harris, Leonard
Meehan, D. Nathan
Or, Dani
Peters, Kenneth Eric
Scow, Kate M.
Thorsen, Leon
Yilmaz, Oz

**SECTION 11**
EARTH RESOURCES ENGINEERING
(SECONDARY SECTION)
Singh, Vijay P.

**SECTION 12**
SPECIAL FIELDS AND INTERDISCIPLINARY ENGINEERING
(PRIMARY SECTION)
Clark, Robert L., Jr.
Davies, John
Fantone, Stephen D.
Fields, Craig I.
Hammack, William S.
Hoehn, Klaus G.
Hrabowska, Freeman A., III
Ioannou, Petros
Kulkarni, Ravindra D.
McDonald, James Rufus
Myers, Herbert Allen
Rajala, Sarah A

**SECTION 12**
SPECIAL FIELDS AND INTERDISCIPLINARY ENGINEERING
(SECONDARY SECTION)
Argrow, Brian
Baraniuk, Richard
Cohn, John Maxwell
Hart, Daniel M.
Kotanchek, Theresa
Monismith, Stephen G.
Nordenson, Guy Jérôme Pierre
Pedreira, Nelson
Schoenung, Julie M
Scow, Kate M.
Sperling, Daniel
Thomsen, Leon
## Class of 2022: By Geographic Location

### ARIZONA
- Mahajan, Ravi Vithal

### ARKANSAS
- Harris, Leonard

### CALIFORNIA
- Ardie, Michael V.
- Bergeron, Kathleen
- Carter, Paul John
- Croak, Marian R.
- Davies, John
- Durlfasky, Louis
- Elgamal, Taher
- Hylton, Nola M.
- Ioannou, Petros
- Ishak, Waguah S.
- Jalali, Bahram
- Kenny, Thomas W.
- Kotanchek, Theresa
- Levay, Marc Stewart
- Monismith, Stephen G.
- Mussallem, Michael A.
- Naeim, Farzad
- Pedraza, Nelson
- Phipps, Marvyn T.
- Schoenung, Julie M.
- Scow, Kate M.
- Sperling, Daniel
- Tomizuka, Masayoshi
- Watkins, Michael M.
- Whitney, Telle
- Wyman, Charles E.
- Yang, Taijen
- Yurko, James A.

### COLORADO
- Argrow, Brian
- Filas, Barbara A.
- Popovic, Zora B.

### DELAWARE
- Yan, Yushan

### DISTRICT OF COLUMBIA
- Fernandez, Nura I.
- Fields, Craig I.
- Hruby, Jill Marie
- O’Neill, Richard P.

### FLORIDA
- Hoehn, Klaus G.
- Lueders, Kathryn
- Manuel, Michele V.
- Shah, Manoq R.
- Singh, Deepika B.

### GEORGIA
- Jones, Christopher W.
- McDonald, John D.
- Sahhindis, Nikolaos V.

### IDAHO
- Mehrotra, Sanjay
- Petti, David A.

### ILLINOIS
- Adebowale, Ahmad Khalid
- Cao, Jian
- Hammack, William S.
- Hashbash, Youssuf M.
- Nahrstedt, Klara

### IOWA
- Myers, Herbert Allen

### LOUISIANA
- Lieberman, Norman P.

### MARYLAND
- Hrabowski, Freeman A.

### MASSACHUSETTS
- Aleyan, Noubar B.
- Andres, Iivani
- Bridges, Charles R.
- Fantone, Stephen D.
- Hajer, Jerome F.
- Madix, Robert J.
- Parris, Colin James
- Ullm, Franz-Josef

### MICHIGAN
- Gray, Dense
- Menassa, Roland J.

### MISSOURI
- Clayton, Norma B.
- Guilk, Farshid
- Mensah, Paul

### NEVADA
- Dettinger, Michael
- Or, Dani

### NEW JERSEY
- Nordenson, Guy Jerome Pierre

### NEW YORK
- Clark, Robert L.
- Jansen, Kathrin U.
- Reiman, Martin L.
- Veloso, Manuela

### NORTH CAROLINA
- Palmour, John Williams
- Rajala, Sarah A.
- Saprio, Guillermo R.
- Ward, Solveig Maria

### PENNSYLVANIA
- Balazs, Anna C.
- Liebert, Rebecca
- Mauro, John Christopher

### RHODE ISLAND
- Karmakas, George Em

### TENNESSEE
- Dudney, Nancy J.

### TEXAS
- Baraniuk, Richard
- Bizios, Reni
- Bokov, Alan Conrad
- Kezunovic, Miladen
- Meenan, D. Nathan
- Miller, Daniel N.
- Musk, Elon Reeve
- Sharma, Pradeep
- Singh, Vijay P.
- Thomasen, Leon
- West, David
- Willcox, Karen E.

### UTAH
- Lappos, Nicholas D.

### VERMONT
- Cohn, John Maxwell

### VIRGINIA
- Magnus, Sandra H.

### WASHINGTON
- Aung, Mimi
- Czerniakowski, Mary
- De Yoreo, James J.
- Hooper, John D.
- Hoveida, Bahman
- Jenekhe, Samson A.
- Karlin, Anna
- Lin, Chao-Hsin
- Myers, Roger M.
- Nadella, Satya
- Robinson, David K.

### AUSTRALIA
- Brown, Edwin Thomas
- Tucker, Rodney S.

### CANADA
- Altintas, Yusuf
- Irwin, Peter A.

### CHINA
- Fang, Daining
- Zhang, Hongliang

### INDIA
- Bhavaneswar, Gurumooorthy
- Chandrasekar, Natarajan
- Kulkarni, Ravindra D.
- Suresh, Byrana Nagappa
- Yadav, Ganapati D.

### SINGAPORE
- Liu, Bin

### SOUTH KOREA
- Kwon, Wook Hyun

### SWITZERLAND
- Farit, Jerome
- Riel, Heike

### TAIWAN
- Tsai, Keh-Chyuan

### TURKEY
- Yilmaz, Oз

### UNITED KINGDOM
- Brandon, Nigel Peter
- McDonald, James Rufus
2022 NAE Anniversary Members
2022 NAE Anniversary Members

50+ YEARS
Members whose names are in boldface type are celebrating their 50th year.

Arthur E. Bryson
John S. Foster, Jr.
Richard J. Grosh
Robert G. Loewy
J. Ross Macdonald
William J. Perry
Morris Tanenbaum

45 TO 49 YEARS
Members whose names are in boldface type are celebrating their 45th year.

H. Norman Abramson
Andreas Acrivos
Alfredo H. Ang
C. Gordon Bell
Daniel Berg
Donald L. Bitzer
Andrew H. Bobeck
Lewis M. Branscomb
John E. Breen
William B. Bridges
Frederick P. Brooks, Jr.
Norman H. Brooks
J. Fred Bucy
Robert C. Dean, Jr.

40 TO 44 YEARS
Members whose names are in boldface type are celebrating their 40th year.

Egil Abrahamsen
John G. Anderson
Seymour Baron
Lionel O. Barthold
Jose B. Cruz, Jr.
Raymond F. Decker
Thomas E. Everhart
Theodore V. Galambos
Robert G. Gallager
William J. Galloway
Richard J. Garwin
Welko E. Gasilch
Kent F. Hansen

Kenneth E. Haughton
Irwin M. Jacobs
Trevor O. Jones
C. Judson King
Donald E. Knuth
James N. Krebs

George Leitmann
William R. Lucas

Robert D. Maurer
John S. Mayo
Charles J. McMahon, Jr.
Carl L. Monismith
C. Kumar N. Patel
J. R. Anthony Pearson
Marc J. Pelegi
John M. Pratsnitz
James R. Rice
Herbert H. Richardson
Stanley T. Rolfe
Irwin W. Sandberg
William R. Schowalter

John P. Hirth
Nick Holonyak, Jr.
Arthur E. Humphrey
Paul C. Jennings
Perry L. McCarty
James K. Mitchell
Johannes Moe
Gordon E. Moore
Ivan E. Sutherland
John B. Wachtman, Jr.
William M. Webster
James G. Wenzel
Amnon Yariv

John H. Seinfeld
John B. Slaughter
Kenneth Thompson
Andrew J. Viterbi
James Wei
Jasper A. Welch, Jr.
Lloyd R. Welch
Albert R. Westwood
Gerald L. Wilson
Theodore Y. Wu
Takao Yokobori
Dante C. Youla
2022 NAE Anniversary Members

35 TO 39 YEARS
Members whose names are in boldface type are celebrating their 35th year.

Dell K. Allen
William A. Anders
John A. Armstrong
Bishnu S. Atal
Norman R. Augustine
Alexis T. Bell
Arden L. Bement, Jr.
Kenneth A. Blenkarn
H. Kent Bowen
Robert L. Byer
William J. Carroll
John F. Cashen
Herbert S. Cheng
Alfred Y. Cho
Anil K. Chopra
Richard M. Christensen
Philip M. Condit
Robert W. Conn
Richard A. Conway
James W. Dally
F. Paul de Mello
Morton M. Denn
Robert H. Dennard
James J. Duderstadt
James M. Duncan
Lloyd A. Duscha
Charles A. Eckert
James Economy
Gerard W. Elverum
Richard E. Emmert
John V. Evans
Edward A. Feigenbaum
John W. Fisher
G. David Forney, Jr.
Donald C. Fraser
Alastair M. Glass
Richard J. Goldstein
Joseph W. Goodman
Arthur C. Gossard
Hermann K. Gummel
Robert S. Hahn
Donald L. Hammonds
Robert D. Hanson
Adam Heller
Alfred J. Hendron, Jr.
Edward A. Hiler
Cyril Hilsun
Yu-Chi Ho
David A. Hodges
William G. Howard, Jr.
John W. Hutchinson
Anthony J. Iorillo
Enich P. Ippen
Robert E. Kahn
Thomas Kailath
Melvin F. Kanninen
Albert S. Kobayashi
Butler W. Lampson
Ronald M. Latanision
Gerald D. Laubach
L. Gary Leal
Peter W. Likins
Benjamin Y. Liu
Dan Lust
John W. Lyons
Robert Malpas
Carver A. Mead
Robert Mehrabian
Chiang C. Mei
Richard C. Messinger
Harold Mires
Albert Narath
George L. Nemhauser
Robin B. Nicholson
William D. Nix
William G. Oldham
Alan V. Oppenheim
Morton B. Panish
Thomas K. Perkins
George P. Peterson
R. Byron Pipes
John W. Poduska, Sr.
Michael Prats
Lawrence R. Rabiner
Raj Reddy
Eli Reshotko
Jerome C. Rivard
Ronald E. Rosenoseweg
Chih-Tang Sah
John H. Schmertmann
Charles D. Scott
Eugene Sevin
Charles V. Shank
Eugene D. Schukin
George E. Smith
Kenneth A. Smith
Ponisseril Somasundaran
Fred I. Stalkup
Dale F. Stein
Charles V. Sterlings
William D. Strecker
Ben G. Streetman
Chung L. Tang
Byron D. Tapley
Nickolas J. Themelis
Vern W. Weeckman, Jr.
Sheldon Weing
Arthur W. Westerberg
John A. White, Jr.
Sheila E. Widnall
Janusz S. Wilczynski
James C. Williams
Edward L. Wilson
Eugene Wong
Abe M. Zarem
Paul Zia
30 TO 34 YEARS
Members whose names are in boldface type are celebrating their 30th year.

Richard C. Alkire
John L. Anderson
Minoru S. Araki
Michael F. Ashby
David H. Auston
Donald W. Bahr
William F. Ballhaus, Jr.
Robert G. Bea
George A. Bekey
John A. Betti
James R. Biard
Joel S. Birnbaum
Richard E. Blahut
Geoffrey Boothroyd
Donald A. Brand
Peter R. Bridenbaugh
Roger W. Brockett
Robert W. Brodersen
Robert A. Brown
Keith A. Browning
Robert D. Burnham
James D. Callen
John R. Casani
Kenneth E. Case
Steve S. Chen
Jon F. Claerbout
Rodney J. Clifton
G. Wayne Clough
James M. Coleman
Harry M. Conger
Lynn A. Conway
Richard W. Conway
Edward J. Cording
Ernest L. Daman
Lance A. Davis
Frederick H. Dill
Stephen W. Director
Steven D. Dorfman
Elisabeth M. Drake
E. Linn Draper, Jr.
T. Dixon Dudderar
Russell D. Doupis
Robert W. Dutton
Robert J. Eaton
Fredric F. Ehrlich
Charles Elachi
Charles Fairhurst
Odd M. Faltinsen
Frank F. Fang
Robert E. Fischell
Edith M. Flanigen
Alan B. Fowler
Judson C. French
Samuel H. Fuller
Elsa M. Garmire
C. William Gear
Thomas G. Giallorenzi
Jerome B. Gilbert
W. Barney Gogarty
Marvin F. Goldman
Richard E. Goodman
Bernard M. Gordon
Paul R. Gray
Donald P. Greenberg
Keith E. Gubbins
Howard R. Hart, Jr.
Henry J. Hatch
Michael Hatatzis
Siegfried S. Hecker
John L. Hennessy
John A. Herbst
Robert J. Hermann
Arthur H. Heuer
Naran G. Hingorani
George I. Hirasaki
Lester A. Hoel
John E. Hopcroft
Izzat M. Idriss
James F. Jackson
James O. Jirsa
Ellis L. Johnson
Gunter F. Jollika
Frank D. Judge
Frank E. Karasz
Richard M. Karp
Robert H. Kingston
David J. Kuck
Lester B. Lampert
Robert S. Langer
Louis J. Lanzerotti
Johanna M. Levetl Sengers
Norman N. Li
Robert H. Liebeck
Barbara H. Liskov
John D. Little
Daniel P. Louchs
Robert W. MacCormack
Alexander MacLachlan
Albert Macovski
Thomas L. Magnanti
Anna M. Marabini
Robert C. Mann
Karl E. Marsteck
Shiro Matsuoka
William C. Maurer
Adolf D. May
John C. McDonald
Eugene R. Mcgrath
James C. Mcgroddy
David G. Messerschmitt
Keith G. Millheim
James W. Mitchell
Sanjoy K. Mitter
Joe H. Mize
L. David Montague
William B. Morgan
Norbert R. Morgenstern
C. D. (Dan) Mote, Jr.
Van C. Mow
Richard S. Muller
Earl M. Murman
Venkatesh Narayanamurti
John Neerhout, Jr.
Stuart O. Nelson
Arun N. Netravali
Shlomo P. Neuman
J. Nicholas Newman
Ronald P. Nordgren
Robert M. Nowak
John H. Nuckolls
J. Tinsley Oden
Ronald R. Parker
Bradford W. Parkinson
Donald R. Paul
Val P. Peline
Arno A. Penzias
Stewart D. Personick
Donald E. Petersen
Edwin P. Przybylowicz
Robert A. Rapp
W. Harmon Ray
Ronald L. Rivest
Enders A. Robinson
Ignacio Rodriguez-Iiturbe
Larry A. Roesner
Ronald A. Rohrer
Murray W. Rosenthal
William B. Rouse
Elbert L. Rutan
Gavriel Sal原czy
Maxine L. Savitz
Alan Schriesheim
Robert J. Schultz
Mischa Schwartz
Norman R. Scott
Laurence C. Seifert
Charles L. Seitz
Frank S. Settles
Robert R. Shannon
Don W. Shaw
Michael L. Shuler
Arnold H. Silver
Leonard M. Silverman
Richard W. Skaggs
Henry L. Smith
Helmut E. Sobieszczyn
James J. Solberg
William J. Spencer
Raymond S. Sta\n
Richard J. Stegemeier
Richard G. Strauch
John H. Sununu
Zeyhe Tadmor
Richard A. Tapia
Robert E. Tarjan
Robert L. Taylor
David A. Thompson
Larry F. Thompson
Charles E. Till
Neil E. Todreas
Rao R. Tummala
Jeffrey D. Ullman
Dianzuo Wang
Kuo K. Wang
William J. Ward, III
Robert M. White
Forman A. Williams
C. Grant Willson
Ward O. Winer
Jerry M. Woodall
Edgar S. Woolard, Jr.
Israel J. Wygnarski
Loring A. Wyllie, Jr.
Henry T. Yang
A. Thomas Young
John A. Young
Jacob Zizv
2022 NAE Anniversary Members

25 TO 29 YEARS
Members whose names are in boldface type are celebrating their 25th year.

Hadi Abu-Akeel
Leonard M. Adleman
Ronald J. Adrian
Alice M. Agogino
John C. Angus
Hiroyuki Aoyama
Karl J. Astrom
Satsuki N. Atulun
Marc A. Auslander
Khalid Aziz
Arthur B. Baggieroer
Ruzena K. Bajcsy
B. Jayant Baliga
Peter M. Banks
Craig R. Barrett
Robert W. Bartlett
David K. Barton
Forest Baskett
Zdenek P. Bazant
Leslie A. Benmark
Robert E. Bixby
Jack L. Blumenthal
F. Peter Boer
David B. Bogy
Lillian C. Borrone
Robert K. Brayton
John D. Bredhooft
James P. Brill
Alec N. Broers
Wilfried H. Brutsaert
Barry C. Buckland
Thomas F. Budinger
Jack E. Buffaloington
Federico Capasso
Renzo L. Caporali
James E. Carnes
Francisco J. Castaing
Vinton G. Cerf
Don B. Chaffin
Donald D. Chamberlin
K. Mani Chandy
Pallab K. Chatterjee
Wai-Fah Chen
Shu Chien
Uma Chowdhry
David D. Clark
Harvey E. Cline
Vance D. Coffman
Joseph P. Colaco
Thomas M. Cook
Donald C. Cox
Magnus G. Craford
Jerome J. Cuomo
David N. Cutler
Mark E. Davis
Carl R. de Boor
Earnest W. Deavenport, Jr.
Nicholas M. Donofrio
Earl H. Dowell
Stephen W. Drew
Thomas W. Eagar
Lewis S. Edelheit
Joel S. Engel
Bruce A. Finlayson
Fred N. Finn
Essex E. Finney, Jr.
George M. Fisher
Marshall L. Fisher
William L. Fisher
Nancy D. Fitzroy
Paul A. Fleury
Samuel C. Florman
Davis L. Ford
Hans G. Forsberg
Richard H. Frenkel
L. B. Freund
Henry Fuchs
William H. Gates, III
Eduardo D. Glandt
Martin E. Glicksman
Ronald E. Goldsberry
Arthur L. Goldstein
Susan L. Graham
Sidney J. Green
Edward M. Greitzer
Charles T. Haan
George I. Haddad
Gene H. Haertling
Edward E. Hagenlocker
Kenneth N. Han
Niels Hansen
Milton E. Harr
Wesley L. Harris
George J. Hess
Gerald T. Heydt
Mats H. Hiltt
J. Brent Hisey
Chih-Ming Ho
Kaare Høeg
George M. Hornberger
Hans G. Hornung
Barry M. Horowitz
Stanley H. Horowitz
Chenming Hu
Thomas J. Hughes
Frank P. Incropera
Akira Ishihara
Iwao Iwasaki
Antony Jameson
Niki S. Jayant
David W. Johnson, Jr.
Donald L. Johnson
Anita K. Jones
William H. Joyce
John L. Junkins
Eugenia Kalnay
Dean Kamen
Paul G. Kaminski
Takeo Kanade
John G. Kassakian
William E. Kastenberg
Susumu Kato
Alan C. Kay
Donald B. Keck
Ralph L. Keeney
Alexander M. Klibanov
Petar V. Kokotovic
Kent Kresa
Herbert Kroemer
Mark H. Kryder
Gerald L. Kulcsinski
H. T. Kung
Charles R. Kurthian
Richard T. Lahey, Jr.
Bruce M. Lake
Larry W. Lake
James L. Lammie
Robert C. Laphrier, III
Richard C. Larson
S. Edward Law
George D. Leal
W. John Lee
Sidney Lebovich
Margaret A. LeMone
Matthys P. Levy
William C. Lindsey
Jack E. Little
Christopher L. Magee
William F. Marcuson, III
Stephen L. Matson
William J. McCroskey
John G. Kassakian
William E. Kastenberg
Susumu Kato
Alan C. Kay
Donald B. Keck
Ralph L. Keeney
Alexander M. Klibanov
Petar V. Kokotovic
Kent Kresa
Herbert Kroemer
Mark H. Kryder
Gerald L. Kulcsinski
H. T. Kung
Charles R. Kurthian
Richard T. Lahey, Jr.
Bruce M. Lake
Larry W. Lake
James L. Lammie
Robert C. Laphrier, III
Richard C. Larson
S. Edward Law
George D. Leal
W. John Lee
Sidney Lebovich
Margaret A. LeMone
Matthys P. Levy
William C. Lindsey
Jack E. Little
Christopher L. Magee
William F. Marcuson, III
Stephen L. Matson
William J. McCroskey
C. Denis Mee
Robert M. Metcalfe
Jarold A. Meyer
James J. Mikulski
Jan D. Miller
Warren F. Miller, Jr.
Parviz Moin
Cleve B. Moler
Francis C. Moon
Manfred Monari
Alan R. Mulally
Andrew F. Neureither
Deborah J. Nightingale
Tak H. Ning
James G. O'Connor
Jimmy K. Omura
Thomas D. O'Rourke
Julio M. Ottino
Louis C. Parrillo
Zack T. Pate
M. Elisabeth Paté-Cornell
David A. Patterson
Judea Pearl
R. Fabian W. Pease
Irene C. Peden
Henry Petrofski
Arun G. Phadke
Nelson L. Pinto
Franz F. Pischinger
James D. Plummer
William F. Powes
Richard B. Priory
Robert A. Pucel
Michael F. Ramage
H. Donald Ratliff
Elsa Reichmanis
Jean-Michel M. Rendu
John R. Rice
Jose M. Roesset
Kenneth M. Rosen
Donald E. Ross
John M. Rowell
Paul E. Rubbert
William B. Russell
Jesse E. Russell
John M. Samuels, Jr.
Isaac C. Sanchez
Stanley l. Sandler
Linda S. Sanford
Ronald W. Schafer
George W. Scherer
Gabriel Schmergel
Ronald V. Schmidt

2022 NAE ANNIVERSARY MEMBERS
25 TO 29 YEARS (continued)
Members whose names are in boldface type are celebrating their 25th year.

Jerome S. Schultz  
Henry G. Schwartz, Jr.  
Lyle H. Schwartz  
Donald R. Scifres  
Robert J. Serafin  
Hsieh W. Shen  
Thomas B. Sheridan  
Jeffrey J. Siirola  

Charles Simonyi  
Larry L. Smarr  
George S. Springer  
Karl J. Springer  

Robert F. Sproull  
Arnold F. Stancell  
Charles R. Steele  
Gunter Stein  

Kenneth H. Stokoe, II  
Michael R. Stonebraker  
Robert Stratton  
Yasuhiro Suematsu  
James M. Synnors  
Simon M. Sze  
George J. Tamaro  
Man-Chung Tang  
Kathleen C. Taylor  
Lewis M. Terman  

Charles H. Thornton  
Matthew V. Tirrell  
Gary L. Tooker  
Shoichiro Toyoda  

James A. Trainham, III  
Avin W. Trivelpiece  

R. Rhodes Trussell  
Stephen W. Tsai  
Richard L. Tucker  
G. Keith Turnbull  
Robert C. Turnbull  
Donald R. Uhlmann  
Fawwaz Ulaby  
Gottfried Ungerboeck  
Andries van Dam  

Theodore Van Duzer  
Robert H. Wagoner  
Jack L. Walker  
Steven J. Wallach  
C. Michael Walton  
Jaw-Kai Wang  
John E. Warnock  

Daniel Weihs  
Sheldon Weinbaum  
W. Henry Weinberg  
Jack H. Westbrook  
Ward Whitt  
Bernard Widrow  

Peter G. Wilhelm  
Niklaus Wirth  
Savio L. Woo  
Margaret H. Wright  
Wm. A. Wulf  
William D. Young  
Ben T. Zinn