## **OFFICERS**

PRESIDENT, 2017-18

Matthew Goldman

PAST PRESIDENT, 2017-18

Robert P. Seidel CBS Television Networks

EXECUTIVE VICE PRESIDENT,

2017-18

Patrick Griffis

Dolby Laboratories

STANDARDS VICE PRESIDENT,

2018-19

Bruce Devlin Mr MXF Ltd.

FINANCE VICE PRESIDENT,

2018-19 Hans Hoffmann

**EBU EDUCATION VICE PRESIDENT,** 

2017-18 Richard Welsh

Sundog Media Toolkit

MEMBERSHIP VICE PRESIDENT.

Peter Wharton

BroadStream Solutions, Inc.

SECRETARY/TREASURER. 2018-19

John Ferder

**EXECUTIVE DIRECTOR** 

Barbara H. Lange SMPTE Headquarters

DIRECTORS

STANDARDS DIRECTORS

John Hurst CineCert LLC

Dave Schnuelle Dolby Laboratories, Inc.

John Snow

Cobalt Digital

**EDUCATION DIRECTORS** 

Sara Kudrle

Imagine Communications

Sean Lancastle

University of Bristol

Yvonne Thomas

Arvato Systems

Jaclyn Pytlarz

Dolby Laboratories, Inc.

MEMBERSHIP DIRECTORS

Karl Kuhn Tektronix Inc.

John Maizels

Entropy Enterprises

Herbert "Jay" Dunmore

Loyola University of Maryland

GOVERNORS

**GOVERNORS-AT-LARGE, 2018** Michael DeValue

The Walt Disney Studios

Seth Hallen

Pixelogic Media Partners, LLC

ASIA/PACIFIC REGION

Ward Hansford, 2018-19

Grass Valley

Masayuki Sugawara, 2017-18 NEC Corporation

CANADIAN REGION

François Vaillant, 2017-18 Christie Digital

Paul Briscoe, 2018-19

Televisionary Consulting

CENTRAL REGION

Brian Claypool, 2017-18

Christie Digital

**EASTERN REGION** 

Renard Jenkins, 2018-19

George Hoover, 2017-18

HOLLYWOOD REGION

Paul Chapman, 2018-19 SIM Group

Andrew G. Setos, 2017-18

Blackstar Engineering

Christopher Fetner, 2017-18 Netflix

INTERNATIONAL REGION

Siegfried Foessel, 2018-19

Fraunhofer IIS

Francois Abbe, 2017-18

Quest Media **NEW YORK REGION** 

Douglas I. Sheer, 2017-18

DIS Consulting Corp.

Sara Kudrle, 2018-19 Imagine Communications

SOUTHERN REGION

Merrick Ackermans, 2018-19 MVA Broadcast Consulting

Michael Koetter, 2017-18 Turner Broadcasting

U.K. REGION

Mark Harrison, 2018-19

Digital Production Partnership

WESTERN REGION

Gary Mandle, 2017-18 Sony Electronics Inc.

Ben Waggoner, 2018-19

Amazon

**SECTION CHAIRS ATLANTA** 

Jack Linder

Jack Linder Consulting

AUSTRALIA

Paul Broderick

Telstra CENTRAL TEXAS

Rick Ackermans (Governor)

CHICAGO

Brian Claypool (Governor)

DALLAS/FORT WORTH

Michael Koetter (Governor)

DETROIT

Frank J. Maynard

CBS Television Stations

**FLORIDA** 

Ken Botelho

Principle Engineering Consultant GERMANY

Siegfried Foessel (Governor)

Fraunhofer IIS **HOLLYWOOD** 

Jim DeFilippis

TMS Consulting

HONG KONG

Terence Wong Hong Kong Design Institute

INDIA

Ujwal Nirgudkar

KPMG India

ITALY

Alfredo Bartelletti

BLT Italia srl MONTREAL/QUEBEC

Daniel Guevin

Radio Canada

NASHVILLE Michael Koetter (Governor)

**NEW ENGLAND** 

Martin P. Feldman

The Camera Co., Inc.

**NEW YORK** Jeff Cohen

TVU Networks

**NORDIC** 

François Abbe (Governor)

OHIO

John R. Owen Q Communications, LLC **PHILADELPHIA** 

Dover Mundt Canon USA, Inc.

PACIFIC/NORTHWEST

Mark Siegel

Advanced Broadcast **PITTSBURGH** 

Ed Fraticelli

POLAND

Kamil Rutkowski *Di Factory* 

ROCHESTER Ricardo R. Figueroa

Rochester Institute of Technology **ROCKY MOUNTAIN** 

Tom Craig Rocky Mountain PBS

RUSSIA

Oleg Berezin Nevafilm Co

**SACRAMENTO** 

Bob Hudelson AJA Video Systems

SAN FRANCISCO

Keith Ian Graham Graham Associates

**TORONTO** 

Leigh Whitcomb Imagine Communications

UNITED KINGDOM Simon Gauntlett

Dolby

WASHINGTON, D.C. Tom Hackett

Communications Engineering, Inc. STUDENT CHAPTERS BY SECTION

**AUSTRALIA** 

Charles Sturt University Wagga Wagga, NSW,

Australia Sydney Student Section Sydney, Australia

**DALLAS** 

Baylor University Waco, TX

CHICAGO Purdue University

West Lafayette, IN

**FLORIDA** Full Sail University

Winterpark, FL

**HOLLYWOOD** Los Angeles City College Los Angeles, CA

Marymount Rancho Palos Verdes, CA

Pasadena City College Pasadena, CA

Media Arts Collaborative Charter School Albuquerque, NM

USC University of Southern California

Los Angeles, CA HONG KONG

Hong Kong Design Institute (HKDI)

Hong Kong Hong Kong Institute of Vocational Education (IVE) New Territories, Hong Kong **NEW ENGLAND** 

Stonehill College Easton, MA

Fitchburg State University Fitchburg, MA

NEW JERSEY

Rowan University Glassboro, NJ

Stevens Institue of Technology Hoboken, NJ

William Patterson University

Wayne, NJ

**NEW YORK** Borough of Manhattan Community College New York, NY

**Bronx Community College** 

Bronx, NY New York City College

of Technology Brooklyn, NY Kingsborough Community College

Brooklyn, NY PHILADELPHIA

Millersville University

Millersville, PA ROCHESTER

Rochester Institute of Technology

Rochester, NY **UNITED KINGDOM** 

Birmingham City University

Birmingham, U.K. Ravensbourne

London, U.K.

Southampton Solent University Southampton, Hampshire, U.K. University of Salford

Manchester, U.K. University of Surrey

Guildford, U.K. WASHINGTON, DC George Mason University

Fairfax, VA Loyola University

Baltimore, MD **BOARD OF EDITORS** 

John Belton, Chairman Ioan Allen

Harvey Arnold David Bancroft

Al Barton Steve Bilow

V. Michael Bove Wavne Bretl

John Brooks Angela Bünger

Patrick Candry Dominic Case Curtis Chan

Philip Cianci Andres C. Colpa Greg Coppa

Don Craig Michael DeValue Michael A Dolan Thomas Edwards

John Emmett Lincoln L. Endelman John Ferder Nuno Fonseca John Footen

Norbert Gerfelder **Brad Gilmer** 

Paul R. Goldberg Keith Graham

Eric Gsell Scott Hamilton John Hartwell

Paul Hearty Hans Hoffmann Randall Hoffner

Tomlinson Holman Fred Huffman Kim lannone

Kees Schouhamer Immink Stephen Jensen

Louis Kerofsky Al Kovalick

Sara Kudrle W. J. Kumeling Vicki Lau

Michael Liebman Peter Ludé John Luff

Ian MacSpadden Andrew H. Maltz Tets Maniwa

Richard Marcus Donald C. McCroskev

William C. Miller Natalie Morningstar Neil Neubert James E. O'Neal

Pirkko Oittinen Karl Paulsen Glen Pensinger

Felix Poulin Charles Poynton Pete Putman Ed Reuss Adam Schadle

Mark Schubin Gavin Schutz Thomas A. Scott Neil Shaw

Wes Simpson Akash Singh Michael Smith

James Snyder

Kevin Sted Steve Storozum Stephen A. Stough

Peter D. Symes Paul Thurston Aleksandar Todorović Upasna Vishnoi Reinhad E. Wagnerr

**Evans Wetmore** 

Jerry Whitaker

Jim Wilkinson

William Y. Zou

SMPTE Motion Imaging Journal (ISSN: 1545-0279) published 10 times per year by the Society of Motion Picture and Television Engineers, Inc., 445 Hamilton Ave., Suite 601, White Plains, NY 10601. Periodicals postage paid at WhitePlains, NY, and at additional mailing office. Copyright © 2018 by the Society of Motion Picture and Television Engineers, Inc. No part of this issue may be reproduced without written permission of the publisher. Statements and opinions expressed in articles or editorials in the SMPTE Motion Imaging Journal are expressions Statements and opinions expressed in arricles or entorials in the SNPTE Motion Imaging Journal are expressions of contributors and do not necessarily represent the policies or opinions of the Society. A complete list of SMPTE membership types and benefits is available at www.smpte.org. Advertisements appearing in this publication are the sole responsibility of the advertiser. Subscription rates: SMPTE Members, \$35 USD, included in membership dues; straight subscription: \$750(shipping included); SMPTE owns the copyrights to all published material, unless otherwise stated. SMPTE Motion Imaging Journal is registered with Canada Post: CPM,# 41003019. POSTMASTER: Send change of address to SMPTE Motion Imaging Journal, 445 Hamilton Ave., Suite 601, White Plains, NY 10601. All rights reserved. PRINTED IN THE USA

SMPT生いかながにあるいける自分のようには、 Restrictions apply.