



SAE International
2019 Annual Report



About SAE International

SAE International is a global association committed to advancing mobility knowledge and solutions for the benefit of humanity. By engaging nearly 200,000 engineers, technical experts and volunteers, we connect and educate mobility professionals to enable safe, clean, and accessible mobility solutions. We act on two priorities: encouraging a lifetime of learning for mobility engineering professionals and setting the standards for industry engineering. We strive for a better world through the work of our philanthropic SAE Foundation, including award-winning programs like A World In Motion® and the Collegiate Design Series™.



\$90,000,000 Revenue (2019)



200,000 Engineers, Experts and Volunteers Engaged



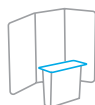
771 New Standards



191 SAE Sections and Chapters



43 New Staff



21 Engineering Events



Raman Venkatesh, Ph.D.
Executive Vice President & Chief Operating Officer

EXECUTIVE MESSAGE

2019 was a transformative year filled with many milestones. I am privileged to lead SAE International, an organization that has built a global portfolio and cemented itself as the leader in connecting and educating mobility professionals to enable safe, clean and accessible mobility solutions.

It is an energizing time for the mobility industry. Society's view of mobility is rapidly evolving. How we move people and goods is changing thanks to technological innovations, but it also results in increased expectations. To ensure continued organizational success and to remain operationally nimble and responsive to the transforming mobility landscape, SAE International has evolved its approach and focus to meet those challenges.

As you will see throughout this annual report, SAE programs are aligned to deliver impactful results for our members, partners and key stakeholders. SAE International ended the year with nearly \$90 million in revenue, which represents three percent growth over 2018, along with significant growth in contributions to our net assets from

operations. These are healthy numbers, especially considering the notable industry headwinds in both the aerospace and automotive sectors our programs encountered in 2019.

SAE International continued to improve our status as a leader within our network and advanced the conversation about mobility in the broader society. In January, a collaboration was announced with SAE Industry Technologies Consortia on the formation of the Automated Vehicle Safety Consortium™ (AVSC) in partnership with leading automakers and technology organizations.

Our global volunteer base of nearly 60,000 engineering experts continued to make pivotal contributions to our standards, events, professional development content and pre-professional education in STEM disciplines. Without that support, we would not be able to effectively produce our programming. Throughout the year, we worked on 537 new and revised aerospace and systems management standards and 234 ground vehicle standards. Across the globe, SAE held 21 events with 950 technical sessions that reached more than 15,000 participants and 2,200 exhibitors serving the world of mobility engineering. And to promote hands-on STEM education, our pre-professional events impacted more than 110,000 students through a series of programs, many of which highlighted emerging mobility technologies.

We recognized the support from all of our contributors in November during our inaugural Contributor of the Year event where we honored our top 48 contributors and named Robert Ireland from Airlines for America as the winner of the 2019 class.

Our members continue to impress with their tireless passion and dedication for the engineering profession within the larger world of mobility and all its allied sectors. We are pleased to see the engagement with SAE International is strong with our members all across the globe. Our chapters and affiliate

organizations around the world have engaging events and programs in their local territories that build and enhance community in the mobility sectors.

Thank you to 2019 Board President Paul Mascarenas and the entire SAE Board of Directors for their tireless dedication and leadership in support of our mission to advance mobility knowledge and solutions for the benefit of humanity. SAE remains committed to pursuing sustainable organic and inorganic growth opportunities to continually advance mobility for humanity, and in so doing, provide increasing value to our members and stakeholders.

There's never been a more exciting time to be an engineer and to serve the business of mobility engineering. With all your support, SAE International is poised to have a bright future.

Raman Venkatesh, Ph.D.
Executive Vice President & Chief Operating Officer



178 Section Events



2,900 College Graduate Members



12 Average Years of Membership



Membership & Volunteering



GROWTH

In 2019, professional member acquisitions reached its highest levels in almost a decade due in part to a new system introduced this year that automatically transfers graduating seniors. As a result, more than 2,900 college graduates became professional members in 2019—a 190 percent increase from 2018. The SAE Propel platform continued to grow and afford volunteer and contributor opportunities. The platform averaged more than 70 volunteer postings each month and received hundreds of unsolicited applications. Interest in becoming a volunteer increased by 25% over 2018, with more than 2,000 individuals signed up for the volunteer pool. Fifty percent of individuals in the volunteer pool have completed a volunteer activity.

SYNERGIES

SAE created the inaugural Contributor of the Year Award in 2019 to recognize contributors for their ongoing commitment to the organization and the mobility industry. The award was bestowed to Robert Ireland from Airlines for America during a reception in Las Vegas in November. The event offered networking and engagement opportunities for the 48 members of the Contributor of the Year Class to share challenges facing the mobility industry and how their collective expertise can deliver solutions.

GLOBAL OUTLOOK

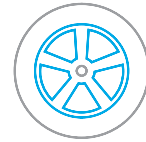
SAE membership is represented across the globe, with a presence in 94 countries and 7,945 cities, as well as all 50 U.S. states. Outside of the North America region, membership includes a heavy concentration in Asia-Pacific (14%) and Europe (6%). Worldwide, SAE members are collaborating through 191 sections—46 SAE Sections of industry professionals and 145 Collegiate Chapters of students. Two professional sections were reactivated in 2019—Texas Gulf Coast and Montreal—and the number of collegiate chapters grew from 122 to 145. Members continue to find long-term benefit in SAE membership with an average membership commitment of 12 years.



650 Committee Meetings



537 Aerospace Standards



234 Ground Vehicle Standards



Standards



GROWTH

In 2019, SAE expanded its mobility focus with the development of a critical and forward-looking portfolio of standards in both the aerospace and global ground vehicles sectors. Nearly 800 new standards in total were worked on, which are critical to the mobility industry and regulatory agencies. This included work initiated on 537 new and revised aerospace and systems management standards, which added to the 7,632 aerospace and systems management standards currently available. In the global ground vehicles sector, work was initiated on 234 new and revised ground vehicle standards, adding to the more than 2,000 ground vehicle standards currently active in SAE's portfolio.

SYNERGIES

SAE J3016™ Standard - Levels of Driving Automation was released and became cited by the industry as the trusted reference for AV classification. Standardization work was initiated in partnership with the US Department of Transportation and industry in the areas of cooperative driving automation. SAE J3194™ Standard - Taxonomy and Classification of Powered Micromobility Vehicles was published to provide clarity and organization around the nomenclature of powered micromobility vehicles. Five additional Aerospace Material Specifications (AMS) on additive manufacturing were published, including SAE AMS7100™ and SAE AMS7101™, the first additive manufacturing polymer specifications for aerospace applications. Two key standards committees, the G-32 Cyber Physical Systems Security and G-34 on Artificial Intelligence in Aviation, were launched and the E-40 Committee on Electrified Propulsion held its first meetings.

GLOBAL OUTLOOK

SAE launched the Beta version of its StandardsWorks™ platform, which transforms the standards development process. SAE also engaged with new global partners to help expand the knowledge and influence of SAE standards, including adding Daimler as a new member of the SAE Motor Vehicle Council and adding Bell, Textron Aviation and UPS as new members to the SAE Aerospace Council. SAE Global Ground Vehicle Standards group increased its international involvement through work with global regulatory agencies to assist in the development of a harmonized mobility ecosystem.



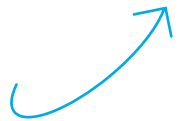
5,000,000 MOBILUS Page Views



2,000 Technical Papers Published



12 EDGE Research Papers



GROWTH

Information Products grew its portfolio and increased its leadership position in important areas, such as AV, connectivity and workforce development. The SAE book program was re-designed to focus on improved quality, production efficiency and time-to-market, resulting in a 26% sales increase from 2018. *The Road to the Top is Not on the Map: Conversations with Top Women of the Automotive Industry* was published in October 2019 and quickly sold out in two weeks. Featuring 36 of the most influential women in the automotive industry, the book was SAE's best seller of 2019. The Road to the Top also earned the distinction of being selected as one of the nine most influential technology books of the year for Gary's Book Club at CES 2020.

SYNERGIES

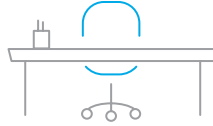
Information Products improved operational efficiency in 2019 through increased collaboration across the organization. Significant impact in direct journal submissions was achieved by reducing editorial turnaround to one-third of the original time. Cross-organizational teams also developed the next generation of authoring tools for standards committees. This facilitated greater collaboration and improved global outreach. Through the cooperation of several business units, Information Products doubled the output and enhanced the quality of written-only technical papers.

GLOBAL OUTLOOK

In 2019, Information Products continued its expansion to digital formats, offering robust and leading content to a global customer base. The implementation of digital production and delivery practices included print on-demand as well as sales and fulfilment on leading online marketplaces. The group also strengthened its approach for protecting SAE intellectual property rights. SAE EDGE research papers were launched with 12 new, original reports that provided international, engineer-authored guidance on working with unsettled technologies. Additionally, the technical paper and journal program was expanded to include more than 2,000 new technical papers and a new journal on transportation sustainability.



362 Total Courses



8,600 Participants in Live Classes



43 Countries with PD Courses



Professional Development



GROWTH

Professional Development expanded its portfolio through on-demand courses and new partnerships. To help the industry address skills gaps in the growing AV workforce, SAE formed a strategic partnership with Argo AI, a leader in automated driving systems, to design a multi-week bootcamp in robotics for software and mechanical engineers entering the workforce. The program, set to launch in 2020, was developed in cooperation with Dr. Venkat Krovi, Michelin Endowed Chair of Vehicle Automation at Clemson University.

SYNERGIES

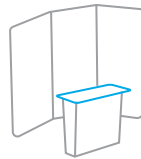
SAE continued to improve the learner experience in 2019. 24 new instructor-led courses, 15 new on-demand eLearning courses, and one new instructional text were developed on SAE key content areas: automated/connected vehicles, vehicle electrification, advanced manufacturing, advanced materials and cybersecurity. The deployment of new mobile capabilities helped deliver online learning assessments and course evaluations through mobile devices. This modern interface proved convenient for the learner by helping reduce customer access issues regarding firewalls and browser compatibility, while prompting the development of new program options.

GLOBAL OUTLOOK

In 2019, Professional Development expanded its global learning base in China, Europe and Latin America. SAE grew the Delegated Product Release Verification Training and Certification Program by 35%, expanded its offerings to 43 countries and taught in eight languages. Specifically in China, programs were rolled out to meet the needs of more than 500 learners in the aerospace and automotive sectors.



15,000 Attendees



2,200 Exhibitors



2,700 Papers Produced



Engineering Events



GROWTH

In 2019, the Engineering Events portfolio evolved to further focus on the expanding view of mobility. Innovations in Mobility was created this year as a forward-looking event that co-located and built upon eight previously-held SAE events with five new technology tracks: Smart Manufacturing, Next Gen Materials, Advanced Propulsion, Smart Mobility and Infrastructure, and Automated and Unmanned Mobility. Held in Novi, Michigan, the event explored the fundamental technological issues facing the mobility industry with leading speakers representing industry, government and higher education.

SYNERGIES

In April, WCX World Congress Experience, the premier global automotive technical event, featured 1,060 technical papers, more than 1,200 presentations and nearly 170 exhibits. Aligned with SAE's efforts to foster informed decision-making about emerging forms of mobility, WCX featured an SAE Demo Days event, which allowed nearly 1,200 participants to experience self-driving vehicle technology firsthand, as well as a Micromobility Pavilion with demonstrations on electric scooters. Emerging mobility was further promoted at COMVEC in September where attendees rode in commercial trucks outfitted with the latest technology, such as lane assist, platooning and more, around the iconic Indianapolis Motor Speedway.

GLOBAL OUTLOOK

SAE hosted a variety of events worldwide to expand its reach to new markets. In March, the On-Board Diagnostics Symposium was held in Stuttgart, Germany, and in June, the Aviation Technology Forum was held in Shanghai, China. The AeroTech Europe event, held in Bordeaux, France, in September, attracted more than 500 attendees and focused on the European aerospace market. SAE also established a partnership in Israel to hold quarterly one-day meet-ups to discuss the latest trends in mobility impacting that emerging market.



40 Countries with PPE Programs



110,750 Students Impacted



172 Individuals Receiving Awards



Pre-Professional Education/SAE Foundation

GROWTH

In 2019, SAE's pre-professional education programs—A World In Motion (AWIM) and Collegiate Design Series (CDS)—served its mission to develop tomorrow's STEM workforce. SAE programming serviced 100,395 AWIM students and 10,355 CDS students, exceeding the original goal by 38%. Through a four-year, \$1.5-million grant from Tesla, AWIM programming will reach 25,000 students in Nevada by 2023. In November, the AutoDrive Challenge™ competition with General Motors was extended to a fourth year, giving participating college students an additional year to develop and demonstrate that their autonomous vehicle can navigate an urban driving course as described by SAE J3016™ Standard Level 4 automation. SAE's STEM engagement leadership position expanded with a formalized online teacher training and certification in the areas of Engineering Design, Cybersecurity, Project-Based Learning and AWIM Challenge-specific learning modules.

SYNERGIES

In October, SAE introduced the SAE AeroConnect Challenge™, a hands-on challenge that tasks university teams to develop a deployable unmanned aerial vehicle (UAV) system with the first-year challenge to aid in supporting wildfire fighting missions in California. The CDS portfolio expanded to directly align programming with enterprise-wide technological focus areas to build the workforce of the future. The SAE Foundation held two programs to obtain unrestricted funding. The Annual Celebration in Detroit in May featured a live interview with Roger Penske and John McElroy for Autoline.tv as well as opportunities for AWIM and CDS students to network with industry professionals. A Pi Day campaign in March garnered the most donations from new individual donors.

GLOBAL OUTLOOK

AWIM programming is now in 17 countries, due in part to a new global expansion plan in partnership with BorgWarner. Outside of the U.S., AWIM's reach increased by 15% in 2019, compared to 2018, exposing Pre-K to eighth grade students to new STEM concepts in their native language. In addition, AWIM's new IT program, Cybersecurity: Keeping Our Networks Secure, gave nearly 250 non-U.S. students an opportunity to discover concepts such as internet protocols, encryption and decryption. CDS, which now includes participants from 23 countries, expanded globally, launching Formula SAE North in Ontario, Canada. The new launch increased the competition's capacity by 20%. Additionally, digital content improved the reach to a global audience. The CDS Podcast Series and targeted YouTube channels expanded to include more than 32,000 CDS Podcast listens and more than 130,000 YouTube views.

2019 BOARD OF DIRECTORS

Paul Mascarenas, OBE
President

Mircea Gradu, Ph.D.
2018 President

Todd Zarfos
2020 President

Pascal Joly
Vice President – Aerospace

Ken Washington, Ph.D.
Vice President – Automotive

Landon Sproull
Vice President – Commercial Vehicle

Pierre Alegre
Treasurer

David L. Schutt, Ph.D.
Chief Executive Officer

Gregory L. Bradley, Esq.
Secretary

Jeff Varick
2018-2021 Director

Rhonda Walthall
2019-2022 Director

SAE LOCATIONS

North America

Warrendale, PA, USA | Headquarters
Troy, MI, USA
Palo Alto, CA, USA
Washington, DC, USA

Europe

Amsterdam, Netherlands
London, UK | SAE Aerospace Standards

Asia

Shanghai, PRC

2019 SAE MEDAL OF HONOR AWARD RECIPIENT

Dr. Mohamed El-Sayed, P.E.

Professor and the Former Director of the School of Engineering Technology Eastern Michigan University

2019 SAE FELLOWS

Rami Debouk

*GM Technical Fellow
General Motors Company*

Ali Emadi

*Professor and Canada Excellence Research Chair Laureate
McMaster University*

John Farrell

*Program Manager, Vehicle Technologies
National Renewable Energy Laboratory*

Dr. Krishna Kamasamudram

*Technical Advisor
Cummins Inc.*

Michael D. Kass

*Senior Research Engineer
Oak Ridge National Laboratory*

Dave Knight

*Global Director, Turf & Utility Platform Engineering
John Deere*

Dr. Yucheng Liu

*Jack Hatcher Chair Professor and Graduate Coordinator
Mississippi State University*

Jerzy Merkisz

*Head of Institute of Combustion Engines and Transport Poznan
University of Technology*

Dr. James Parks

*Group Leader - Applied Catalysis and Emissions Research
Oak Ridge National Laboratory*

Dr. Andrew C. Pickard

*Associate Fellow, Systems Engineering
Rolls-Royce Corporation*

Denise M. Rizzo

*Senior Research Mechanical Engineer
US Army CCDC Ground Vehicle System Center (GVSC)*

Saeed Siavoshani

*Electrification & Hybridization Technical Specialist
Siemens PLM & Wayne State University
Adjunct Professor*

James Turner

*Professor of Engines and Energy Systems
University of Bath*

John Waraniak

*Vice President of Vehicle Technology
Specialty Equipment Market Association (SEMA)*

Guangqiang Wu

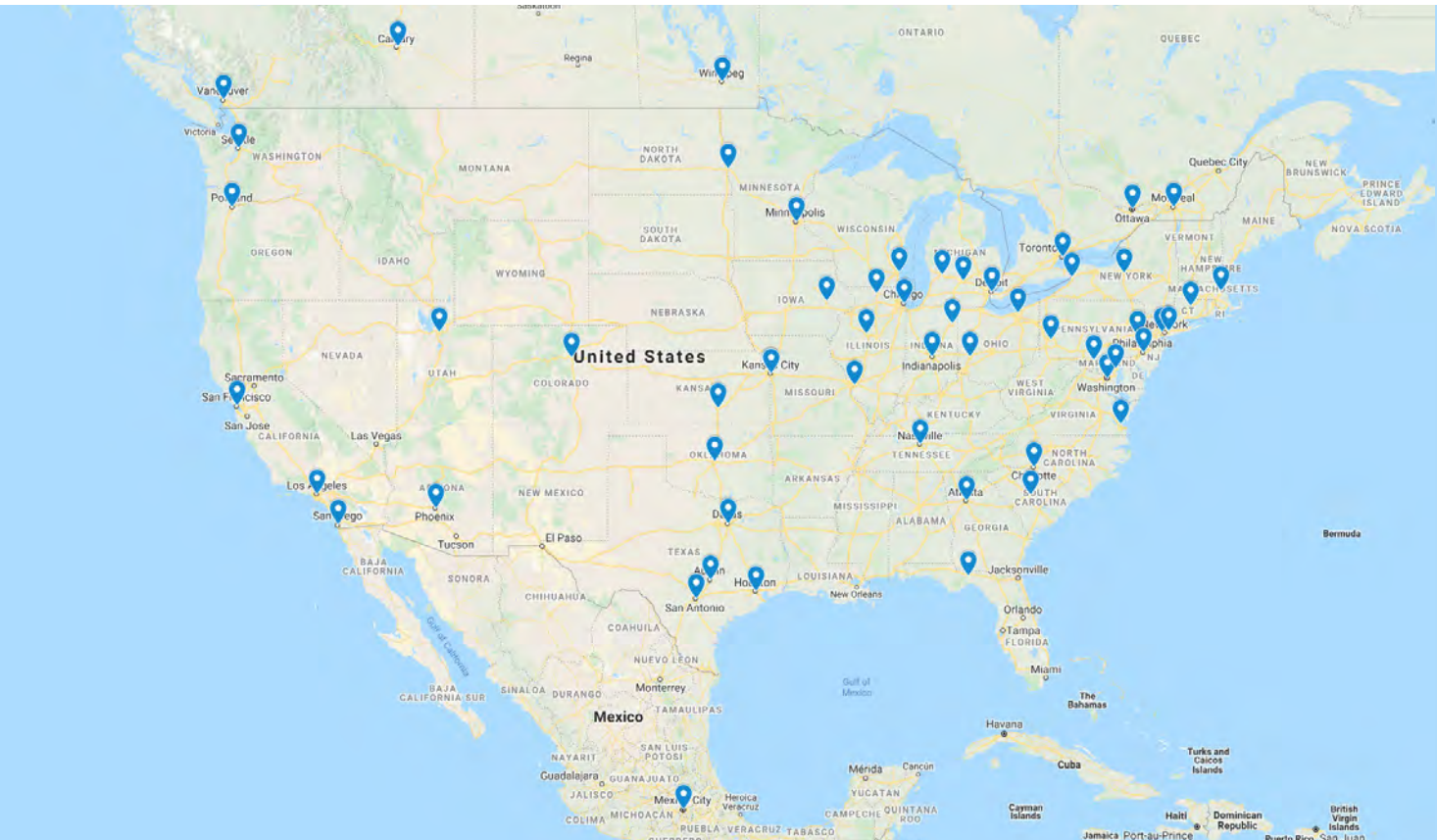
*Professor & Director
Tongji University*

Mingfa Yao

*Professor & Director
State Key Laboratory of Engines (SKLE),
Tianjin University*

Yunqing Zhang

*Professor, School of Mechanical Science and Engineering
Huazhong University of Science and Technology*



SAE Professional Sections | North America

UNITED STATES

Allentown, Pennsylvania
 Atlanta, Georgia
 Austin, Texas
 Baltimore, Maryland
 Buffalo, New York
 Cambridge, Massachusetts
 Cedar Rapids, Iowa
 Charlotte, North Carolina
 Chicago, Illinois
 Cleveland, Ohio
 Columbia, South Carolina
 Dallas, Texas
 Dayton, Ohio
 Denver, Colorado
 Detroit, Michigan
 Fargo, North Dakota
 Flushing, Connecticut
 Flushing, New York
 Fort Wayne, Indiana
 Grand Rapids, Michigan

Hagerstown, Maryland
 Hampton Roads, Virginia
 Hartford, Connecticut
 Houston, Texas
 Indianapolis, Indiana
 Kansas City, Kansas
 Kansas City, Missouri
 Lansing, Michigan
 Los Angeles, California
 Milwaukee, Wisconsin
 Minneapolis, Minnesota
 Nashville, Tennessee
 Newark, New Jersey
 Oklahoma City, Oklahoma
 Peoria, Illinois
 Philadelphia, Pennsylvania
 Phoenix, Arizona
 Pittsburgh, Pennsylvania
 Portland, Oregon
 Rockford, Illinois
 Salt Lake City, Utah
 San Antonio, Texas

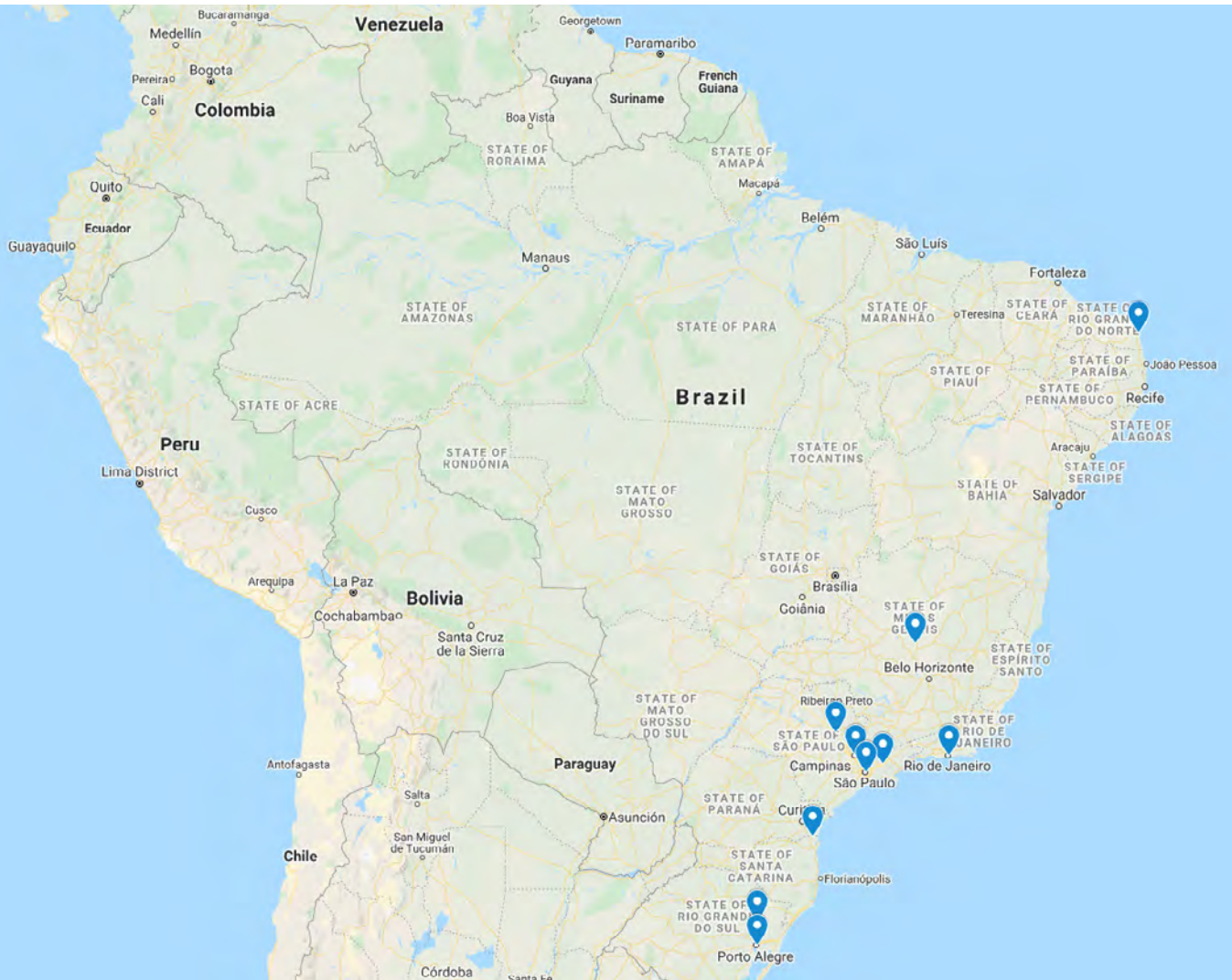
San Diego, California
 San Francisco, California
 Seattle, Washington
 St. Louis, Missouri
 Syracuse, New York
 Tallahassee, Florida
 Washington, DC, District of Columbia
 Wichita, Kansas

CANADA

Alberta (Calgary/Edmonton), Alberta
 Vancouver, British Columbia
 Winnipeg, Manitoba
 Montreal, Montreal
 Toronto, Ontario
 Ottawa, Ontario
 London, Windsor, Ontario

MEXICO

Mexico City, Mexico

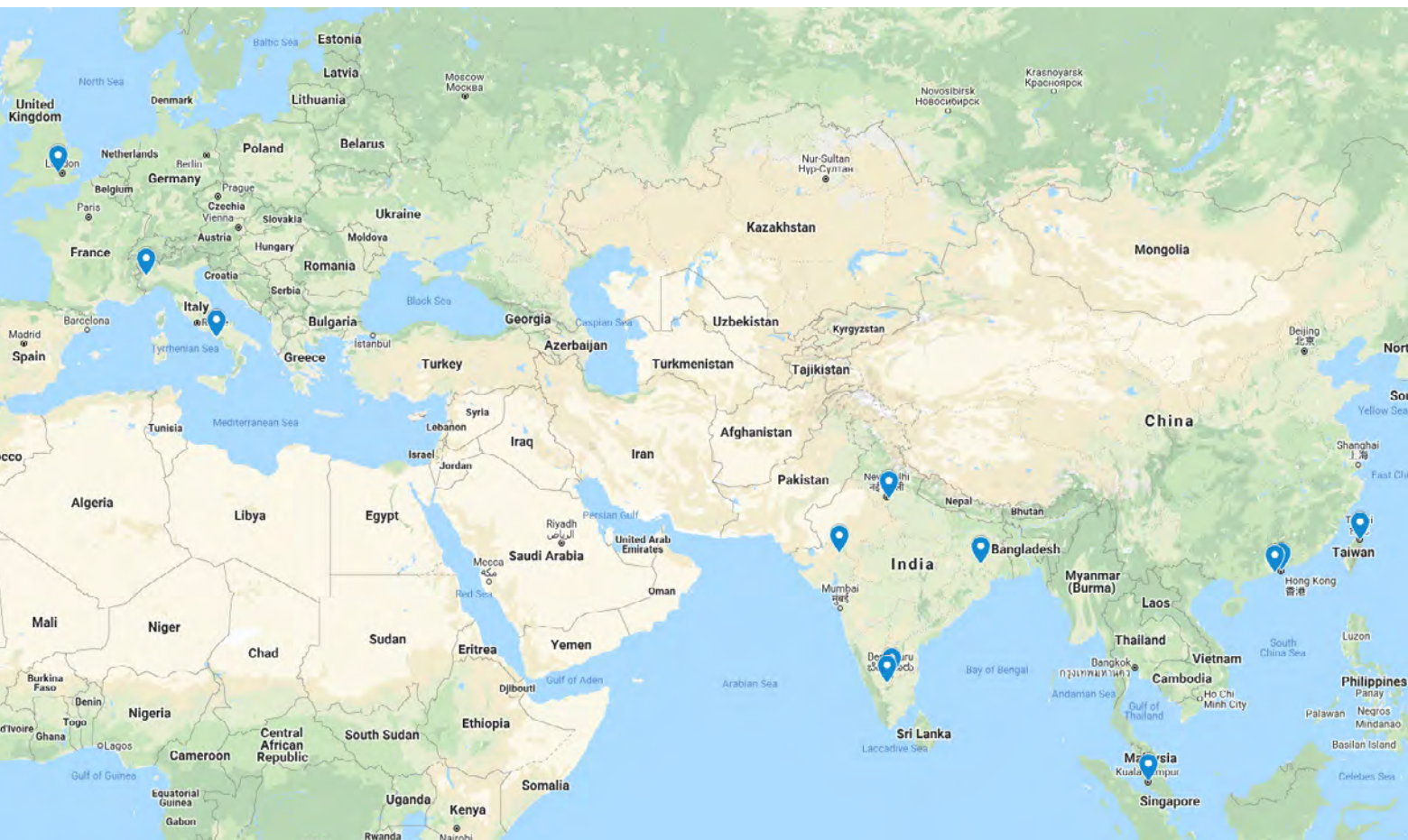


SAE Professional Sections | South America

BRAZIL

Organized Under Our Affiliate, SAE Brazil

- Campinas, Brazil
- Caxias do Sul, Brazil
- Minas Gerais, Brazil
- Natal, Brazil
- Rio de Janeiro, Brazil
- Rio Grande do Sul
- Parana/Santa Catarina, Brazil
- Sao Carlos, Brazil
- Sao Jose dos Campos, Brazil
- Sao Paulo, Brazil



SAE Professional Sections | Europe and Asia

ITALY

Naples, Italy
Torino, Italy

INDIA

Organized Under Our Affiliate, SAE India

Bangalore, India
Eastern India
Northern India
Southern India
Western India

ASIA

Hong Kong, Hong Kong
Macau, Macau
Kuala Lumpur, Malaysia
Taipei, Taiwan