SAE Foundation℠
Inspiring Curiosity in STEM

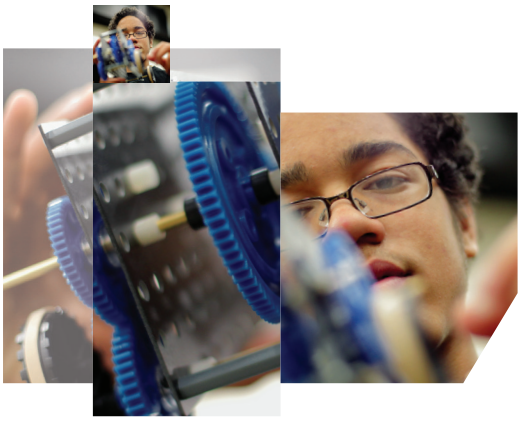
SAE INTERNATIONAL AND GM FOSTER THE ENGINEERS OF TOMORROW

General Motors and SAE International have teamed up to provide K–college students with stimulating, hands-on STEM educational opportunities guided by industry experts. These programs aim to inspire curiosity in STEM education and ultimately transform today's students into tomorrow's engineers. By supporting the SAE Foundation, the charitable arm of SAE, General Motors aligns its business needs with an organization dedicated to the development of the future workforce.

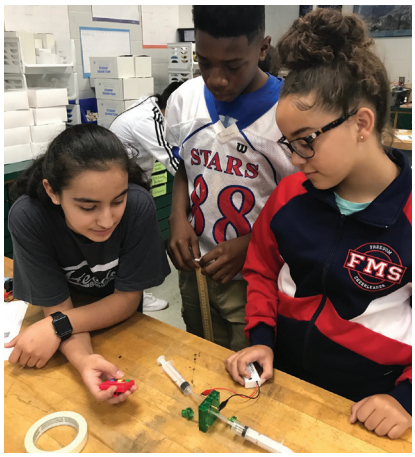
Fueled by GM's contributions, beginning in 1986, including a $5 million gift in 2004 and almost $2 million since, these two organizations have been making unparalleled impact in STEM curriculum development and delivery, reaching hundreds of thousands of students, and providing GM employees with inspiring and engaging volunteer opportunities through SAE's STEM education programs. Over the years, GM has fully funded initiatives including Fuel Cell Challenge, Gravity Cruiser, Making Music Challenge and the soon-to-be-released Programming Each Other. GM's employee volunteers serve as formal mentors and volunteers throughout the academic year, and the number of participants continues to trend upward, increasing from 1,463 in 2014 to 1,826 in 2017.

"I joined SAE as a student member when I was an 18-year-old college freshman, and now, as an SAE Foundation Trustee for five years, I'm inspired and honored to be giving back. We want to help young people of all ages understand how great engineering careers are and help them prepare for those careers. We envision a future with more engineers—because we believe it will make the world a better place."

— Dan Nicholson, Vice President of Electrification, Controls, Software & Electronic Hardware



GM AND SAE FURTHER EARLY EDUCATION THROUGH A WORLD IN MOTION



Together, GM and SAE are nurturing STEM skills and inspiring STEM interest at the K–8 level, partnering to develop and support a comprehensive education program called A World in Motion (AWIM). AWIM is working to engage and inspire students at the earliest age possible to pursue STEM subjects and careers. Each AWIM activity follows a curriculum built around the engineering design experience and requires students to work in teams to solve a "challenge" in designing, building and testing a product. An industry volunteer works in the classroom to assist teachers with AWIM content delivery and serve as a role model, community liaison and professional resource. This winning combination of a pedagogically sound curriculum, teacher professional development and the use of STEM professionals in the classroom has proven to be effective. Two years after using AWIM, twice as many students in the younger cohorts listed a potential STEM-related college major.

> "AWIM sparks that interest in science, math, technology and engineering careers, even at the youngest age. A 5th grader told me she now wants to be an engineer. That idea would never have crossed her mind without these experiences."
>
> — 5th grade teacher

Distribution and resource development for all AWIM curricula focus on GM communities, especially in southeast Michigan, Phoenix and Austin, and teacher and volunteer training for employees and teachers has increased in these areas. In 2017, GM expanded its relationship with SAE to fund a new teacher professional development (PD) model for AWIM. This includes a full LMS integration for online/on-demand teacher PD in cybersecurity, project management and engineering design. This platform will be the first of its kind to fully accredit K–8 teachers in these disciplines through a teacher credentialing system.

Through GM's support, the AWIM Challenge IT: Keeping Our Networks Secure has been added to the program. This first-of-a-kind, classroom-tested curriculum provides students with the opportunity to experience and understand the difficulties involved in securing information on the internet. Throughout the challenge, they examine issues regarding data storage and transmission, focusing on the vulnerabilities of data and the systems that address those vulnerabilities. By investigating the two basic components of securing data and systems—encryption and authentication—students learn about network security as it relates to self-driving cars, a critical area in automotive engineering now and in the coming years.

GM and SAE advance post-primary education with the Collegiate Design Series (CDS)

In addition to early education, GM supports college-level students through the Collegiate Design Series. CDS connects classroom learning with real-life application, challenging students with hands-on, team engineering experiences in designing, building and testing vehicles while also connecting them with fellow students from around the globe. All competitions within CDS prepare undergraduate and graduate engineering students for future employment in mobility-related industries by challenging them with hands-on, team engineering projects that require effective budgeting, communication, project management and resource management skills—the top skills most valued by today's innovative organizations.

GM AND THE AUTODRIVE CHALLENGE™

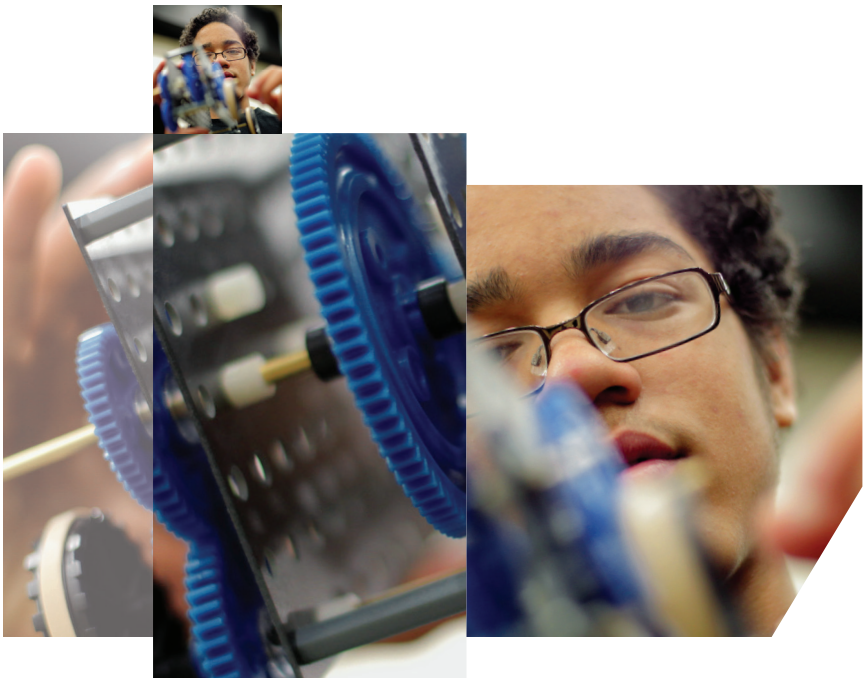
The AutoDrive Challenge™ is part of SAE's Collegiate Design Series, a diverse collection of engineering competitions including Aero Design, Clean Snowmobile Challenge, Formula SAE, Formula Electric, Baja SAE and Supermileage. In 2017, GM and SAE launched a three-year autonomous vehicle design competition, with the technical goal of navigating an urban driving course in an automated driving mode (related to the SAE J3016 Level 4 Automated Driving standard). A total of 474 students, from eight North American universities, are currently participating in the AutoDrive Challenge™, and GM has provided each team with a Chevrolet Bolt EV as the vehicle platform. Additionally, GM supported the three-year competition with a $5.12 million contribution. Throughout the competition cycle, students and faculty participate in technology-specific workshops to help their concept refinement and overall autonomous technical understanding, and strategic partners and suppliers provide vehicle parts and software to aid students in their technology development.

These student teams are exposed to a wide range of educational and research opportunities, and they actively learn about real-world applications for the latest sensing technologies, computing platforms, pattern recognition, machine learning, artificial intelligence, sensor fusion, autonomous vehicle controls and more. Each team receives support from a dedicated GM mentor who is a full-time employee of General Motors or GM Canada.

WHAT'S AHEAD

These programs represent the "classroom" of tomorrow, where learning is personalized, project-based and happens in different times and in different places. Students gain field experience, interpret data and make choices in their own education, leading to greater student ownership of the curricula. In 20 years, students will have so much independence in their learning process that mentoring will become fundamental to student success—and programs like the ones offered by GM and SAE will become increasingly crucial for education and for workforce preparation.

In order to succeed in the society of tomorrow, all children need to understand and apply STEM concepts in a real-world integrated setting. In addition to becoming literate in STEM disciplines, students must learn to solve complex problems, communicate clearly, raise questions, assimilate information and work cooperatively toward common goals. Working with schools and partners to promote STEM at a young age is an important way that companies can develop the talent that will lead them into the future. Together, GM and SAE are helping today's students become tomorrow's engineers and scientists, preparing and inspiring the next generation that will be creating the technology of the future.



SAE International has reached over 5 million students and involved over 30,000 industry professionals in its comprehensive pre-K through college STEM education programs. Through these programs, along with its scholarships and prestigious awards, the SAE Foundation continues to inspire the next generation of innovators. To learn more about SAE's STEM initiatives and to get involved, visit **SAEFOUNDATION.ORG**

P18260013