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MOMENTUM

THE MAGAZINE FOR STUDENT MEMBERS OF SAE INTERNATIONAL™

PINK POWER

Team from New Mexico State takes on Baja and cancer

INTERNATIONAL RELATIONS

Mizzou welcomes Russian students

Baja in the blood

It's red all over for Cummins engineer

October 2015 magazine.sae.org/mom

generationauto

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What makes the automotive industry a "cool" industry in which to work?

This contest invites students who participate in the SAE Collegiate Design Series™ competitions to create and submit videos highlighting the diverse aspects of the automotive industry that make it an attractive or "cool" industry in which to work. Cash prizes are offered to the SAE CDS teams with the top three videos.

The need for a highly skilled and technical workforce has never been greater, and the industry offers a myriad of opportunities for ambitious students who desire a challenging career in a fast-paced industry.

SAE CDS team video submissions of no more than two minutes in length can now be uploaded to the contest website. Two rounds of judging will rate the selected videos on a set of criteria including message, accuracy and creativity. For the final round of judging, the three videos with the highest ratings will be viewed and voted on by attendees at the OESA Annual Outlook Conference on Nov. 10, 2015. Winners will be announced at the conclusion of the conference.

Discover what SAE CDS students think...view their videos at http://bit.ly/1xC8TEj

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A GROUP OF STUDENTS FROM NEW MEXICO STATE UNIVERSITY FORM THE INSTITUTION'S FIRST ALL-FEMALE BAJA SAE TEAM. (PHOTO BY HEATHER KELLY, CAPTURED DETAILS PHOTOGRAPHY)

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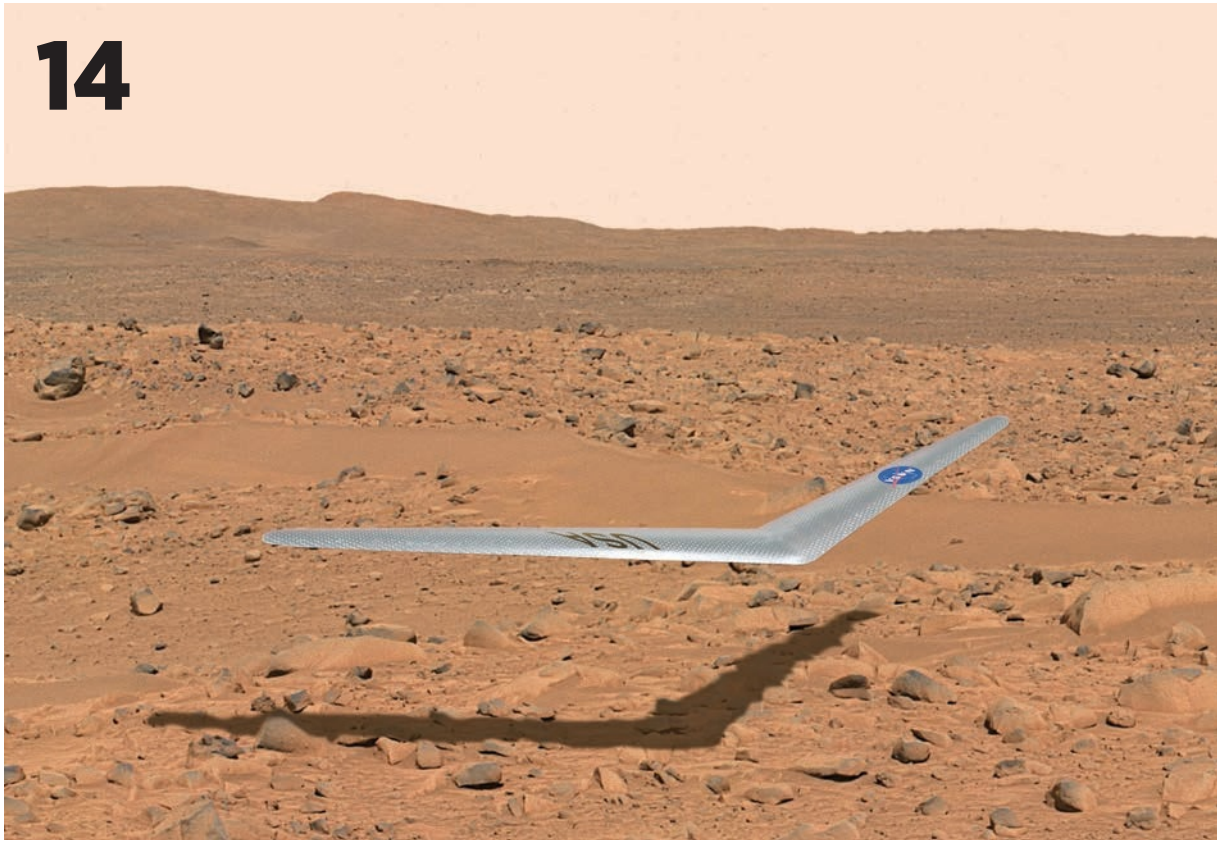

EDITORIAL

STICKING WITH SAE FOR THE LONG HAUL

Patrick Ponticel, *MOMENTUM* Editor

No less an engineering visionary than Elon Musk has cited Formula **SAE** experience as a key consideration in the hiring of college engineering graduates. Third-party endorsements from him and others validate the belief among SAE staff that you appreciate the value of your SAE student membership.

What you may not fully appreciate is the degree to which membership in SAE can serve you over your long, bright career.

Right now, you're intently focusing on your studies—as you should be. It's smart to keep your eyes on the ball. Soon (if not already), many of you will be carving out hours from an already stacked schedule to spend with your SAE Collegiate Design Series team in preparation for the coming year's competitions. That's also a wise appropriation of time yielding high returns. Add in little spurts of sleep here and there, some sports and entertainment once in a while, an occasional trip home to see the folks, girlfriend/boyfriend time—how's a student supposed to find time to think about the future?

We can't help you solve that age-old college conundrum. You'll find the time somehow. When you do, please be sure to figure SAE into the equation. We will be a valuable partner for you throughout your career, starting with four years of discounted SAE dues as you transition from student member to professional member.

Although you have access to various member benefits as students, the job you get may require greater reliance on them. You'll have a leg up on other engineers who choose not to become SAE professional members and who thus cannot take advantage of discounts on a rich menu of products and services—be they standards, professional-development courses, papers, or any number of other highly relevant technical offerings that will help you get the job done and impress the boss.

Brain food, such as a technical paper, is great. But remember to put some soul food on your plate too. As a professional member of SAE, you will be joining a body of 138,000+ engineers/souls who share their inspiration and camaraderie. This invaluable collective human resource will be available to you via the new online Member Connection (read about it on page 18) and other global platforms. And with your local SAE section, you will have a forum in which to forge mutually fruitful personal and professional connections on a one-to-one basis.

If the SAE circle of life plays out, your membership will help you grow in technical expertise, self-confidence, and a willingness to share your time and insights. Gradually, you will become the mature SAE member who inspires younger members. We want you to stay in the circle—to help make it a stronger one for you, for SAE, and for mobility engineering as a whole.

GET INVOLVED

- Become a *MOMENTUM* contributor by submitting an article. Add that achievement to your resume. Send an email to **momentum@sae.org** expressing your interest in contributing.
- Spread the word about this magazine to other engineering students and faculty, and encourage them to join SAE today by visiting **www.sae.org/membership.**

SAE International sections

SAE International sections are local units comprised of 100 or more SAE International members in a defined technical or geographic area. The purpose of local sections is to meet the technical, developmental, and personal needs of the SAE members in a given area. There are more than 42 established sections in the United States and Canada, as well as international sections/groups and SAE International affiliate organizations. For more information, please visit www.sae.org/sections.

Collegiate chapters at SAE International

Collegiate chapters are a way for SAE International student members to get together on their campus and develop skills in a student-run and -elected environment. Student members are vital to the continued success and future of SAE. While your course work teaches you the engineering knowledge you need, participation in your SAE collegiate chapter can develop or enhance other important skills, including leadership, time management, project management, communications, organization, planning, delegation, budgeting, and finance. For more information on how to find your local chapter, please visit http://students.sae.org/chapters/collegiate/

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GEORGIA TECH AND UNIV. OF MARYLAND WINNERS IN HELICOPTER DESIGN CONTEST

Georgia Institute of Technology students placed first in the undergraduate class and second in the graduate class of AHS International's 32nd Student Design Competition. Winners were announced in August. The **University of Maryland** won first place in the graduate category. Georgia Tech teamed with **Middle East Technical University** to design a quad-rotor package

The University of Maryland's AHS Student Design Competition team members are (left to right) Brandon Gudenius, Daigo Shishika, Chris Bogdanowicz, Stacy Sidle, Brandyn Phillips, Justin Winslow and Xing Wang. While Philips was not a member of the actual design team, he provided the team assistance on building a working prototype.

for each of its entries. In its winning graduate-class design, the University of Maryland team chose a novel quadrotor-biplane-tailsitter concept with the ability to hover, transition quickly into high speed forward flight, and efficiently transition back to hover for landing. Visit http://vtol.org/education/student-design-competition for information about next year's competition.

SAE COLLEGIATE DESIGN SERIES REGISTRATION OPENS SOON

Online CDS event registration will open on the following days for the 2016 **SAE** CDS season:

- SAE Aero Design Series - Monday, Oct. 5
- Baja SAE Series - Tuesday, Oct. 6
- SAE Clean Snowmobile Challenge - Wednesday, Oct. 7
- Formula SAE Series - Thursday, Oct. 8
- SAE Supermileage - Friday, Oct. 9

Participants at the 2015 Formula SAE event in Michigan listen as the driver's briefing is given.

For the affiliated Formula Hybrid event, registration for the Hybrid category will open on Oct. 8, at 10:00 a.m. EDT. For the Electric category, it opens on Oct. 12, at 10:00 a.m. EDT. For entry of a second team vehicle, it opens on Oct. 19, at 10:00 a.m. EDT.

TOYOTA TABS MIT AND STANFORD FOR ARTIFICIAL-INTELLIGENCE RESEARCH

The research and development of intelligent vehicle and mobility technologies will get a major boost in an ambitious new collaboration between **Toyota**, **Stanford**, and **MIT**. The world's largest automaker on Sept. 4 announced that it will be investing approximately $50 million over the next five years to establish joint artificial-intelligence research centers at each university. The goal is to reduce traffic casualties and assist drivers in various ways.

ALUMINUM WIRING CORROSION TOPIC OF AWARD-WINNING DESIGN

Federal regulations are challenging automakers to wring as many miles as possible from every drop of fuel, and one of the easiest ways to do that is to make lighter vehicles. Last year, one of the world's leading auto industry suppliers enlisted a senior design team at **Michigan Technological University** to help it do just that. For its efforts, the team earned first place in the Senior Design category at the University's Design Expo 2015. The team from the Department of Materials Science and Engineering focused on what might happen in an automotive fuse box if the housing were to fail and salt spray from wet roads splashed onto the wiring, developing an innovative mechanism to evaluate the corrosion behavior of lightweight aluminum. The team members for the project were Annie LeSage, Alexandra Glover, Kyle Myszka, and Jacob Gerdt.

Senior Design Team members Kyle Myszka and Annie LeSage presented their team's winning poster at the 2015 Design Expo.

BAJA SAE RULES UPDATED FOR 2016 ANNIVERSARY YEAR

With a recent posting for Baja **SAE**, rules for all of the 2016 SAE Collegiate Design Series programs have been updated. "While the rules committee and SAE have strived to improve and clarify some rules, change is inevitable, and without it we become stale," said Sam Barill, SAE staff lead organizer for the off-road competitions. "While there are many reasons for changes, take heart that all have their history and none were made for frivolous reasons. In the early years, there were three-wheeled vehicles and few safety features. If you have been to an event or two lately, you know that safety is a priority." Keep an eye out for Baja SAE updates from Sam at #bajasamscorner. He notes that 2016 will mark the 40th anniversary of the Baja SAE competitions. Ten teams competed in the first year; last year, 300 teams competed in the three Baja SAE events.

FINDING SUCCESS ON AN INTERNATIONAL TRACK

Student members of the University of Missouri's Formula SAE team are learning firsthand that international collaboration is the future of engineering.

FEATURE

Mizzou Racing faculty advisor Marty Walker (right) presents Polytech NCM faculty advisor (and student) Evgeni Zahlebaev with a Mizzou Engineering souvenir during Mizzou's visit to St. Petersburg in March. (Photo by Vasiliy Dorofeev of Polytech NCM)

IT WAS A COOL THURSDAY MORNING in November—too early for most students to be bustling about Lafferre Hall at the **University of Missouri**. But Mizzou Racing team members were preparing for a video conference that would mark the beginning of a great relationship between two distinguished universities. Sitting quietly in a small office, the team waited for a video call from Russia. Communicating with each other over an eight-hour time difference is something the two teams would become quite familiar with throughout the next year.

That day, Mizzou Racing had its first video conference with the Formula SAE team of **St. Petersburg State Polytechnic University** as a part of the U.S.-Russia Peer-to-Peer Dialogue Program. Funded by the U.S. embassy in Moscow, the program's goal is to "support unique projects centered on Russian-American, peer-to-peer collaboration."

The proposed collaboration between Mizzou Racing and Polytech NCM received one of only 30 competitive federal grants available in 2014. This grant enabled Mizzou and Polytech to collaborate on the creation of the first Formula Student team in northwest Russia. The grant also provided Mizzou Racing with its first opportunity in years to showcase its success on an international stage.

As part of the program, students from Mizzou visited St. Petersburg in March 2015. Some of the highlights of their visit included touring international manufacturing facilities, visiting the St. Petersburg State Polytechnic University campus, and spending time working with the Polytech NCM racing team.

"International collaboration is invaluable in engineering today," said Mizzou's chief powertrain engineer and senior

Polytech NCM team captain Artem Lebedev photographed at the welcoming ceremony for the Mizzou team held in Russia during the last week of March 2015. Lebedev was unable to make the trip to the U.S. (Photo by Vasiliy Dorofeev of Polytech NCM)

Nate Conrad. "Our team was able to experience that firsthand before starting our careers beyond FSAE."

One of the goals of the partnership was to foster a mutually beneficial working relationship between the experienced team at Mizzou and the first-year team at Polytech.

"They [Polytech NCM] have very different struggles than we do," explained Mizzou team president and senior Rory Hourihan, "particularly when it comes to importing [parts for the car]. They don't have the same obstacles that we face, and that was probably my biggest takeaway."

"International collaboration is invaluable in engineering today."

Mizzou senior Nate Conrad

International collaboration between student design teams provides students with the unique opportunity to overcome challenges that many engineers face on a daily basis. The two teams had to establish an understanding of their cultural and language differences in order to work together. Said Conrad, "...We learned to communicate despite a noticeable language barrier. We

Mizzou gears up for FSAE-Australia

Collegiate design programs such as Formula SAE enable students to explore international engineering before they choose a career. For the third time since the team was founded in 1985, the **University of Missouri**'s Mizzou Racing team will be competing internationally at Formula SAE-Australasia (FSAE-A) in Melbourne. During Mizzou Racing's last appearance at FSAE-A in 2010, the team earned a 6th-place finish. After finishing 5th out of 80 teams at FSAE Lincoln in June, Mizzou Racing is confident in repeating their success at FSAE-A in December.

Students who have the opportunity to attend international design competitions understand the importance of approaching engineering with a worldly view. Engineers today face many obstacles in designing and manufacturing their ideas on an international scale. Participating in collegiate design competitions abroad, such as FSAE-Australasia, gives students additional opportunities to experience these challenges firsthand.

"The competition presents a new set of challenges in itself," Hourihan said. "There is a slightly different set of rules to abide by, as well as significant logistical and financial challenges." The cost of international competitions is the main barrier to entry for most foreign teams. Shipping a Formula SAE vehicle overseas requires a substantial investment of time and financial resources.

Mizzou Racing team leaders Nate Conrad (driving) and Jason McLoud discuss race strategy at the Formula SAE Michigan event in May 2015. (Photo by Vasiliy Dorofeev of Polytech NCM)

Shipping by air allows for the maximum vehicle testing time before competition and a minimal three-week shipping period, but is also the most costly option. A much less expensive alternative is shipping by sea; however, this method can take as long as three months. It's a difficult cost vs. time dilemma. In Conrad's mind, "Working through challenges like this as a team equips us with fundamental knowledge that we can't learn in the classroom."

With an international competition on the schedule in December, Mizzou Racing will have to continue testing and tuning its 2015 competition car for the car's final run while simultaneously developing and manufacturing its 2016 car and fundraising for FSAE-A. The strenuous schedule will be tough, but to the hundreds of engineers who compete internationally in Formula SAE each year, the hard work leads to indispensable, real-world advantages.

Mizzou Racing has a 100% job placement rating over the past five years—a testament to the notion that in the competitive engineering job market, experience is everything.

Alyssa Black

Mizzou Racing and Polytech NCM pose for a team photo in Victory Lane at Michigan International Speedway during Formula SAE Michigan. Left to right are Chris Head, Alyssa Black, Vasiliy Dorofeev (Polytech NCM), Roman Vinokurov (Polytech NCM), Tony Hodgson, Brandon Clodfelter, Lauren Wertz, Vsevolod Kuzminykh (Polytech NCM), Rory Hourihan, Jason McLoud, Ryan Minick, Daniel Freiberger, Ethan English, Evgeni Zahlabaev (Polytech NCM), Austin Lambert, Danny Radomski, Griffin Shoupp, Brandon Schulhof, and Tom Chaney. In the car is Nate Conrad.

were always able to work through any miscommunications we encountered."

Conrad and Hourihan are two of many team leaders whose extensive experience continues to bring significant benefits to the budding Polytech NCM team. The teams jointly applied for the Peer-to-Peer follow-up grant in June 2015 and are awaiting a response. With an aerospace background working for companies such as **Boeing** and **LMI Aerospace** and an automotive background from **General Motors**, **Ford**, and **Honda**, Mizzou Racing is well equipped to aid in Polytech NCM's development. In its first year of competition, Polytech has already established a solid foundation for success. The team's composition of engineers and business majors mirrors that of professional level racing teams and will enable it to flourish well into the future.

The next step in the program included a visit to the United States in May, where members of Polytech NCM attended the Formula SAE Michigan competition as honorary members of Mizzou Racing. They left with a better understanding of the competition's static events such as technical inspection and cost, and dynamic events including acceleration and endurance. This exposure to an FSAE event is crucial, as Polytech NCM was slated to compete for the first time at Formula Student Czech Republic in September.

Moving forward, the teams plan to continue their collaboration through exchanging design ideas, testing, and simulation data over the course of the next competition year. Some of the most successful American FSAE teams have collaborated internationally.

"We want to understand how working together helps build a better car," Hourihan said. "It's something professional engineers do every day, so why shouldn't we start now?"

If you are interested in learning more about Mizzou Racing, please visit www.mizzoufsae.com or www.facebook.com/mizzoufsae. ■

Alyssa Black, chief business officer for Mizzou Racing, wrote this article for *MOMENTUM*. She is a senior studying marketing and sport management at the University of Missouri. (Photo by Morgan McOlash)

BAJA BLOOD RUNS THICK IN CUMMINS ENGINEER'S VEINS

Brad Cottrell can't seem to get Baja out of his blood.

That's because he's not really trying to.

The 26-year-old native of Louisville parlayed a long Baja SAE career at the **University of Louisville** into an engineering position with the famous engine maker **Cummins**. But he had no intention of saying bye-bye Baja.

"After graduation," he told *MOMENTUM*, "I found a way to stay involved in Baja by helping to plan the off-season Baja race hosted by the University of Louisville and called Midnight Mayhem. Then a few fortunate twists and turns later, I eventually got the opportunity to attend the Baja SAE Auburn competition on behalf of Cummins as a recruiter."

Cottrell's five years of Baja SAE experience as a student was critical in Cummins's eyes, he explained: "For the position I was being interviewed for [high horsepower service engineer], they wanted somebody who could work great on a team, create detailed schedules, work with a budget, give presentations, and handle all of the typical engineering work. Everything outside of the engineering work is something most students only get a brief opportunity to learn. Through Baja, I was able to really develop those skills and set myself apart in a way that the Cummins recruiters really picked up on, and it ultimately lead to me getting the job.

"Almost every aspect of what I learned while on the team has helped me in some way with my career. As a service engineer, I use all of my experience with design, fabrication, assembly, testing, and validation to improve the products I'm involved with. One of the most important skills I learned had nothing to do with engineering;

Does this photo look familiar? Snapped by Brad Cottrell, it's the one that appeared on the cover of September's *MOMENTUM*. We might have to list the young man as "Contributor-At-Large" on the magazine masthead!

Brad Cottrell in Cummins red at his company's Baja SAE Auburn recruiting booth earlier this year. He is serving as one of the lead coordinators for the Oct. 3 Midnight Mayhem, which he describes as "the biggest non-sanctioned Baja event in the U.S. with an anticipated 80-plus cars running."

I learned how to become a more effective communicator through my involvement with giving shop tours, public speaking events, sponsorship meetings, and presenting all the different aspects of the Baja car. As somebody who is constantly working with large teams, clear and concise communication is an invaluable tool that I use every day."

On the University of Louisville Baja team, Cottrell served as team welder, chassis and suspension fabricator, shop manager, co-captain, and a "go to guy" when new team members wanted training on the heavy equipment. It was spring 2013 when he completed his master's degree in mechanical engineering. "I took a few months off so I could participate in the two remaining Baja SAE competitions," he said. "After the 2013 Baja season finished, I started my job in July of 2013."

On the University of Louisville team, Cottrell recalled, "I started out by being completely overwhelmed and a bit intimidated, but continued to show up because of all the things Baja offered. I realized early on that many people won't get the same chance to work on that kind of a team, be allowed to operate machining equipment, apply their school work to something fun, or even have their hobby help get them a job in the future. That's why I jumped into Baja and never wanted to get out."

His debut recruiting for Cummins was similar in some ways to his initiation on the Louisville Baja team.

"Once again, I sometimes felt completely overwhelmed and a bit intimidated by all of the work I had to do, but knew this would be an experience that not too many other people would get," he said. "Now that I'm on the other side of the competition as a sponsor, I have to say it doesn't feel all that different. I'm still involved in a team that works hard in preparing for the next Baja event, I still have to work with a set budget. I have to spend long hours working hard during the competition, just to go to a hotel room and continue working, and after the competition wraps up, more to do. Still, after the awards are given out and I catch a breath, I am in complete shock by how much fun I had and how quickly it seemed to end." ■

By Patrick Ponticel, *MOMENTUM* Editor

FEATURE

A VISION. A CAR. A CAUSE.

New Mexico State Aggies are tough enough to race pink.

Shown with the original New Mexico State University Baja team's car are members of NMSU's new team (NMSU Pink Baja, or T2). Sitting to the left of university athletics mascot Pistol Pete are Crystal Smith and Caitlynn Roy, sitting on the tire is Rachel Olivas, sitting in the car is Katharine Harrel, sitting on the ground are Yvonne Krimmer and Rachel Tessier, sitting on the stone are Jaymie Velasquez and Sandra Zimmerman, and standing is Leslie Hathaway. (Photo by Heather Kelly, Captured Details Photography)

AT **NEW MEXICO STATE UNIVERSITY**, big is the only way to dream. At least if you are an undergraduate engineering student and work alongside Ken Ruble.

If that were the case, you would be writing this article about a crazy idea to design, fabricate, and race a car in one year with a team of girls most of whom have little to no design or manufacturing knowledge.

Oh, and reach out to a dynamic pair of the most respected organizations ever to promote breast cancer awareness and fund-raise for cancer research in the process.

Impossible? Challenge accepted.

Forward five months. New Mexico State University. **"NMSU Aggies are Tough Enough to Wear Pink"**. **Cowboys for Cancer Research**. The plan is in place, the partnership as strong as the founders of the "Tough Enough" organization (who, by the way, are cancer survivors), and the race is on—the race to break down the intimidation barrier that exists in motorsports of being a female in a male-dominated sport. The will to perpetuate the love of learning. The race to find a cure for cancer.

So how did this journey begin? Why is NMSU Pink Baja willing to attempt the impossible?

The answer is Ken Ruble.

After a career in industry working for **Lockheed Martin** and **Raytheon**, Ken went back to school and graduated from NMSU in 2008 with his B.S. in mechanical engineering. As a product of the very program in which he now teaches a manufacturing class, Ken also serves as the advisor to NMSU **SAE** Mini Baja. His passion for motorsports has been lifelong. For the past 30 years, he has had his hands on a car, in a car, or under a car in some form.

> *"The key to a successful finish is to start with a great plan."*
>
> Ken Ruble, NMSU's SAE Baja advisor

First as a member of the NMSU Mini Baja team and now as a mentor, Ken's commitment to excellence has ignited students with a fierce passion to take the impossible by the horns and make it attainable.

Ken often tells his students, "The key to a successful finish is to start with a great plan." You could say that students have taken this statement to heart.

Leonardo Borrego from T1 works with Caitlynn Roy (holding steering wheel) and Katharine Harrell from T2 to obtain initial ergonomic measurements for T2's new car, which is now in the build phase. Some members of T2 helped build T1's car. (Photo by Jaymie Velasquez)

"Guns Up" - NMSU Pink Baja 2015-2016. (Photo by Heather Kelly, Captured Details Photography)

BUILDING THE BAJA TEAM

This year, NMSU has its sights set on perennial and newfound success. The university already has an existing SAE Baja team. Joining that one will be NMSU's first-ever all-female group composed of engineering, business, and marketing students. The original team, affectionately called T1, seeks to optimize its car and vigorously test it before competition. The new startup team, T2, is placing a heavy emphasis on planning and organizing to establish their team. They are strategically developing a business and marketing model that will enable them to design, manufacture, and competitively race a new car this coming year at competition.

Perhaps even more ambitious, T2 plans on a six-week build time frame to get it done. They might be crazy, or they might believe in the notion that innovation can be a calculated process of organization, laser focus, and clear precision in execution—with, of course, generous applications of elbow grease and sweat equity.

The organization will not be top-down, nor will it be bottom-up. The business and team strategy is to run a horizontal organization composed of technical leads, business leads, organizational leads, sponsorship leads, and scheduling leads. The concept is that every member has ownership of an area, making the team as a whole nimble, fast-moving, and capable of fabricating a car that is simple, clean, and well-engineered.

For Leslie Hathaway, a junior in mechanical engineering, this endeavor is "about putting together a team that has ownership of something they created from the very beginning and they each get the opportunity to put their hands on it and have a sense of accomplishment and belonging."

For NMSU Pink Baja, there is a deliberate focus on creating an environment that encourages learning. The opportunity this team presents to learn together is what has sparked interest, and grown the team. NMSU SAE Pink Baja believes that if you have passion, interest, and willingness to learn, engineering is for you. You're a business major, but want to learn to TIG-weld? Great, we want you on our team.

Rachel Tessier, a mechanical engineering senior that is jointly pursuing her M.B.A., explained, "We want to learn, first of all. Learn how to be safe in a manufacturing and racing environment, learn time management and communication, both within our team and with the organizations we build relationships with."

In conjunction with classroom knowledge, T2 plans to collectively draw on industrial experience gained at corporations where team members have been employed: **Chevron Phillips**, **Cummins**, **ExxonMobil**, and **Intel**, to name a few. As a team, they will apply academic and industry skills to compose a marketing plan and fabricate a car that meets SAE Baja rules and regulations.

NMSU Pink Baja emphasizes teamwork and collaboration. (Photo by Heather Kelly, Captured Details Photography)

Team member Katrina Heyne preparing for the acceleration race with the T1 car at a competition last year.

PARTNERSHIP IS A PINK PRIORITY

Innovative engineers of today have a sound foundation in the technical, but they must navigate the business and marketing worlds as well to ensure they understand and meet the needs of the client. It is with this mentality that T1 will provide mentoring and advice on the technical end while T2 will impart their planning and organization skills to T1. Together, they will form a collaborative relationship that students hope will result in the best year yet for Mini Baja at New Mexico State University.

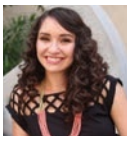
This symbiotic model is not unique to NMSU SAE Mini Baja. A similar partnership also exists with "NMSU Aggies are Tough Enough to Wear Pink" (TETWP), and Cowboys for Cancer Research (C4CR)—foundations dedicated to finding a cure for cancer.

"NMSU Aggies are Tough Enough to Wear Pink" is a breast cancer awareness and fundraising volunteer organization based in Las Cruces, New Mexico. Co-founders Pat Sisbarro and Laura Conniff, both cancer survivors, are credited with taking Wrangler's breast cancer awareness themed rodeo and making it the largest "Tough Enough to Wear Pink" event around the globe. "NMSU Aggies are Tough Enough to Wear Pink" has partnered with C4CR since 2007.

Collectively, the foundations have generated more than $3.5 million in cash and in-kind donations. Said C4CR president Lynn Arnold, "one in every eight people will have breast cancer in their lifetime. In 2015, an estimated 231,840 new cases of invasive breast cancer are expected to be diagnosed in women in the United States. In 2015, about 2,350 new cases of invasive breast cancer are expected to be diagnosed in men."

The statistics are staggering and real, but for NMSU Pink Baja, building a car this year is an opportunity. An opportunity to engage peers and raise awareness and funds for research at the university level. An opportunity to design and engineer with a unique business model. An opportunity to encourage women to pursue their passions by creating a place for them to contribute and thrive in an engineering environment. It's a big undertaking, but we do it as a community.

Together, "NMSU Aggies are Tough Enough to Wear Pink", Cowboys for Cancer Research, and New Mexico State University Pink Baja are racing to learn and be competitive, but more importantly, we are racing for the cure. ■



Jaymie Velasquez, a senior in chemical engineering at New Mexico State University, wrote this article for *MOMENTUM*.

FROM FORMULA SAE TO FORMULA 1

Since I was a young child, I have had an interest in cars—fostered by working with my dad on old restoration projects from a young age, and furthered by beginning to kart at age 8. As I grew older, I became curious about how things actually worked, a fascination which complemented my interest in cars, as I loved taking things apart to understand how they worked before putting them back together. When the time came to apply to colleges, I was specifically looking at schools that would allow me to attain practical experience within engineering, and through research it quickly became clear that the best way for me to do this was through Formula SAE.

Jason Zide works closely with his line manager, Rob Dorney, Head of Transmission Design at Infiniti Red Bull Racing, in the team's U.K. technical office.

I decided to go to the **University of Southern California**. USC had USC Racing, an FSAE program that was in the very early stages of re-founding after a multiple-year hiatus. For me, this actually turned out to be a blessing in disguise because when I first got involved with the project, I quickly learned about the difficulties the team had with money, resources, equipment, and a lack of prior knowledge. As a small, new team, we were doing most things for the first time, without years of knowledge and experience. While this was a big challenge, it pushed our team to work even harder to improve and opened up the possibility for me, as a younger member, to have a larger degree of responsibility. As a sophomore I was elected powertrain team lead, and the following year I was elected as one of the team captains, serving as project manager.

During a summer internship at **Nissan/Infiniti**, I learned about the Infiniti Performance Engineering Academy (IPEA). The academy was an opportunity provided by Infiniti Motor Co. for three engineers from anywhere in the world to work at Infiniti Red Bull Racing in England, with a view to building closer ties between road and racecar processes, people, and technology. The prize included a 12-month paid internship working for the Formula One team and an Infiniti Q50 company car.

After an initial selection process based on a technical essay and a Skype interview, I was invited to participate in the final event at Infiniti's Technical Centre for Europe in the U.K. The final included 12 extremely talented engineers from across the globe and involved a variety of assessments such as presentations, exams, and team-based challenges. Nearly all of the candidates had Formula SAE experience, and it was immediately evident why. All had a phenomenal aptitude for engineering in both a theoretical and practical sense. Personally, I felt that my experience with Formula SAE was extremely beneficial during the application process for the academy, as I was able to apply the skills that I developed through FSAE to all assessments.

It was incredibly exciting to be considered among one of the 12 Infiniti finalists given the caliber of everyone present, but especially rewarding to be chosen as one of the three winners. Over this past year, I have had the opportunity to work with extremely experienced engineers and to be at the forefront of Infiniti's partnership with the team. For example, flying to Japan last year to work with four-time World Champion Sebastian Vettel on an Infiniti prototype vehicle project was incredible! I was also lucky enough to attend the 2015 Monaco Grand Prix as a brand ambassador for Infiniti and acted as a judge in the IPEA's recent U.S. finals in Nashville for the next internship competition (see sidebar).

The experiences have reinforced my opinion of the value of FSAE, and I wholeheartedly believe that without my experience working on USC Racing, I would have been much less prepared for my role. I look forward to returning to USC and bringing what I have learned in my phenomenal year with Infiniti Red Bull Racing back to the team.

Jason Zide, Infiniti Placement Design Engineer and a senior pursuing a bachelor's degree in mechanical engineering at the University of Southern California, wrote this article for *MOMENTUM*.

Illini student lands 2015 IPEA spot

Alex Allmandinger of the **University of Illinois** will be the sole U.S. college student to participate in the 2015 **Infiniti** Performance Engineering Academy (IPEA), now starting its second year. He recently was selected from among 12 finalists, half of whom, including Allmandinger, are active in Formula **SAE**. Part of his internship, along with those of four other students from around the globe, will be spent with the Infiniti Red Bull Racing Formula One team.

"It still hasn't sunk in, but I am incredibly excited about joining the IPEA," he said soon after his selection. "It really is a dream come true, and I can't wait to get started. It will be the best 12-month learning experience of my life."

F1-bound Alex Allmandinger

FEATURE

A high school student analyzes files during the digital forensics challenge segment of the CyberAuto event.

CYBERAUTO CHALLENGE HELPS CLOSE TALENT GAP

Having a supply of high-quality young engineers is key to beefing up the automotive industry's cyber defenses.

A GROUP OF UNLIKELY ALLIES huddled together recently in Detroit: automobile engineers, high school and college students, researchers, government officials, and "white hat" hackers.

They had curiosity on their minds and good intentions in their hearts.

The group was participating in the 2015 SAE Battelle CyberAuto Challenge, a five-day camp in which 61 students and professionals were parceled into four teams and presented with a series of challenges to explore the security of modern automobile computer systems.

The event is ground zero for the creation of a pipeline of new cyber engineers—students who will someday help the automotive industry not only create onboard computer systems, but keep them safe from those with mischief on their minds.

"At **SAE International**, education is a critical part of our mission, and creating the next generation of automotive engineers is paramount to that cause," said Patti Kreh, New Program Development Manager, SAE Industrial Technologies Consortia. "Events like the Challenge are an extension of our commitment to STEM (science, technology, engineering and mathematics) education. Like our award-winning A World in Motion program for elementary, middle, and secondary students, and the Collegiate Design Series, the SAE Battelle CyberAuto Challenges provides students with hands-on engineering experiences."

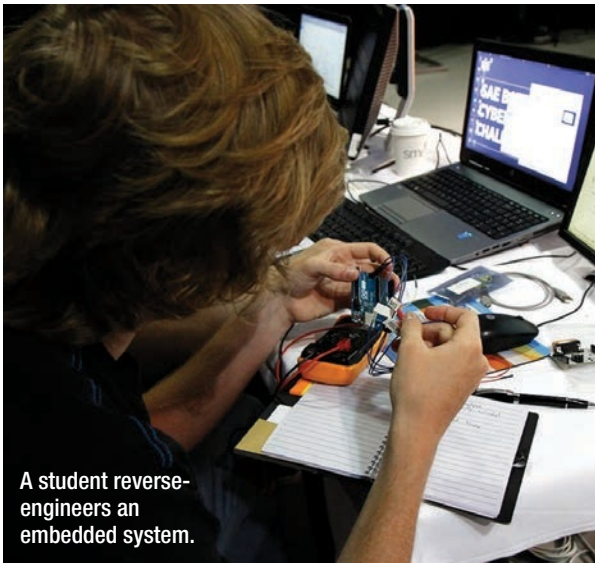
Hosted July 13-17 at Delphi's Innovation Center in Troy, Mich., a total of 27 students participated in the Challenge—18 from high school and 9 from college. Most were from Michigan. The next Challenge is planned for July 25-29, 2016, at Macomb Community College in Warren, Mich.

Battelle, the Columbus, Ohio, research giant, held the first CyberAuto Challenge in 2012. The annual event is now led by SAE and supported by Battelle along with **Delphi**, the **Michigan Economic Development Corporation**, and **SquareOne Education Network**.

The Challenge is growing in importance as automobiles become more computerized; modern vehicles have millions of lines of code and are increasingly connected to the internet. These factors increase the opportunities for better-performing cars, but they also open up potential avenues for those with bad intentions. OEMs are diligently working to create protected systems through a variety of ways. A part of the solution is developing engineers with a particular mindset and skill set.

The series of instructional activities at the CyberAuto Challenge requires both technical skills and an appropriate level of curiosity. **AutoImmune**, co-founded by Karl Heimer and Rob Dekelbaum, organized the Challenge's instructional program. The auto industry lacks qualified "aggressors," said Heimer. "It's not in the auto industry's culture, or in the normal way of thinking, to believe the universe is out to cause harm. However, in the cyber uni-


Students work on reverse-engineering embedded hardware with instructor Katie Weaver.


A student reverse-engineers an embedded system.

verse, there are players trying to attack and always someone out there, for a variety of reasons, trying to corrupt the system."

To expose students and the auto professionals to this way of thinking, each team had a security researcher, also known as a "white hat hacker," injecting their insights on how to have an aggressor's attitude. Each of the hackers had previous experience breaching a defended system.

But the Challenge is not breeding the future cybercriminal, and the students chosen to participate must pass rigorous testing and background checks.

The auto industry faces competition for young bright minds. The Challenge introduces some of the best engineering students in the country to a fascinating field, and they are responding. Students from as far off as Japan are eager to attend the Challenge. And the experience is paying off, as former Challenge participants have been hired by automobile manufacturers and government agencies, and others have received internships.

"The Challenge gives students the hands-on experience OEMs are seeking," said Dekelbaum. "Students involved with the Challenge are going to have a leg up in getting a job over someone who can only explain a theory. At the Challenge, students get a real-life experience with vehicle systems and work as part of a professional team under real time pressures."

Zach Cousineau, 17, a senior at Morley Stanwood High School in Morley, Mich., was one of the students who made the cut.

"This seminar has been a great learning experience for me," he said. "This has really gotten me excited about a possible career in cybersecurity. Before I started the CyberAuto Challenge, I was unaware of the opportunities in cybersecurity. I like what's going on here and what I'm learning. I hope to be a computer science major, and cybersecurity would be a great profession."

William D'Angelo, 16, a senior at Dakota High School in Macomb, Mich., who has a passion for cars and hopes to someday be an automobile engineer, said of the CyberAuto Challenge: "Now that I'm here and I've seen what's going on in the field, I'm excited about the possibility of computer engineering and cybersecurity as a career. There are security hazards with any computer system, but I would love the challenge of solving those problems. The Challenge has shown me another possible career path to engineering."

A CyberAuto Challenge intern (and previous student) prepares the learning environment for this year's students.

Silvio Porco, 17, a senior at Northville High School in Northville, Mich., who plans to major in engineering at the University of Michigan, said the CyberAuto Challenge "has opened my eyes to the whole world of cybersecurity. I was leaning toward chemistry or some type of materials engineering, but I think cybersecurity might hold a place in my future. You never stop to think that there are people out there who might try to corrupt a system, because that's not the way I think. It would be a challenge to create strategies for security systems and ways to make the systems tamper-proof."

Was the Challenge successful? At graduation, when students were asked who would consider a career in automotive, all 27 hands shot up in air. Kreh noted with a smile, "SAE is pleased to forge the next generation of cyber auto engineer." ■

By Patti Kreh, SAE Industry Technologies Consortia, and Robin Yocum, Yocum Communications

PREPARING FOR FIRST FLIGHT ON MARS

With its eye on Mars, **NASA Armstrong** has been working on a prototype it refers to as the Preliminary Research Aerodynamic Design to Land on Mars, or Prandtl-m, which is "a flying wing aircraft with a twist." It is planned to be ready for launch from a high-altitude balloon later this year and will be released at about 100,000 ft. That altitude will allow it to operate in similar flight conditions as the Martian atmosphere, according to Al Bowers, NASA Armstrong Chief Scientist and Prandtl-m Program Manager.

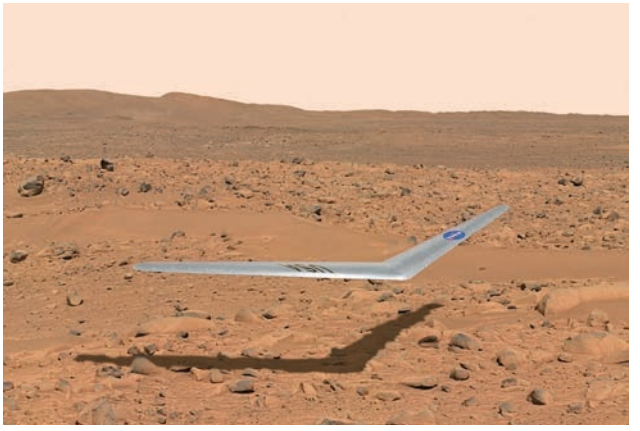
Testing is expected to lead to modifications that will allow the aircraft to fold and deploy from a 3U CubeSat in the aeroshell of a future Mars rover. A CubeSat is a miniature satellite used for space research that is usually about 4-in in each dimension; a 3U is three of those stacked together.

Bowers describes the aircraft as being part of the ballast that would be ejected from the aeroshell that takes the Mars rover to the planet. It would be able to deploy and fly in the Martian atmosphere and glide down and land. "The Prandtl-m could overfly some of the proposed landing sites for a future astronaut mission and send back to Earth very detailed high-resolution photographic map images that could tell scientists about the suitability of those landing sites," he said.

Because the Prandtl-m could ride in a CubeSat as ballast aboard the aeroshell/Mars rover piggyback stack going to Mars in 2022-2024, the additional weight would not add to the mission's cost, he said. Once in the Martian atmosphere, the Prandtl-m would emerge from its host, deploy, and begin its mission.

"It would have a flight time of right around 10 minutes. The aircraft would be gliding for the last 2000 ft to the surface of Mars and have a range of about 20 miles," Bowers said.

But first, "We're going to build some vehicles and we are going to put them in very unusual attitudes and see if they will recover. Our expectation is that they will recover.



An illustration depicting what a Preliminary Research Aerodynamic Design to Land on Mars (Prandtl-m) aircraft might look like flying above the surface of Mars. (Photo by NASA/Dennis Calaba)

As soon as we get that information, we will feel much better flying it from a high-altitude balloon," said Bowers.

"The actual aircraft's wingspan when it is deployed would measure 24 in and weigh less than a pound," Bowers said. "With Mars gravity 38% of what it is on Earth, that actually allows us up to 2.6 lb and the vehicle will still weigh only 1 lb on Mars. It will be made of composite material, either fiberglass or carbon fiber. We believe this particular design could best recover from the unusual conditions of an ejection."

The Flight Opportunities Program, which is managed at NASA Armstrong, will fund two balloon flights during the next several years and potentially a sounding rocket flight following that to demonstrate how the flier would work on Mars. The flights will be at one of two locations–Tucson, Arizona, or Tillamook, Oregon.

"We are going to use GPS initially, but obviously there is no GPS on Mars, so later on we will have to find something

Waiting for data to download from a Prandtl-d flight are (left to right) Jonathan Zur, Alexandra Ocasio, Derek Abramson, Red Jensen, Etan Halberg and Keenan Albee. (Photo by NASA/Ken Ulbrich)

else for navigation," Bowers said. "But the little autopilot that provides the waypoint navigation, that's one of the things we're going to exercise on a research vehicle and then on the prototype that flies on a future balloon flight."

The flight test could also include some scientific research that will apply to a Mars mission.

"We could have one of two small science payloads on the Prandtl-m on that first balloon flight," Bowers said. "It might be the mapping camera, or one might be a small, high-altitude radiometer to measure radiation at very high altitudes of Earth's atmosphere. Eventually the aircraft may carry both of them at the same time."

A second research flight from a balloon is planned for next year and would feature an aircraft capable of returning to the launch site on a flight that could be as long as five hours as it glides back to Earth, he said.

The proposed Prandtl-m is based on the Prandtl-d seen coming in for a landing during a flight test in June. The aerodynamics offer a solution that could lead to the first aircraft on Mars. (Photo by NASA/Ken Ulbrich)

Success could lead to a third mission that is already being discussed because the Flight Opportunities Program has access to a sounding rocket capable of going to very high altitudes, Bowers said.

"That mission could be to 450,000 ft and the release from a CubeSat at apogee," he said. "The aircraft would fall back into the Earth's atmosphere and as it approaches the 110,000- to 115,000-ft altitude range, the glider would deploy just as though it was over the surface of Mars.

"If the Prandtl-m completes a 450,000-ft drop, then I think the project stands a very good chance of being able to go to NASA Headquarters and say we would like permission to ride to Mars with one of the rovers."

By Jean L. Broge, *Aerospace Engineering*

SCHAEFFLER'S ELECTRIC POWERTRAIN PRIMED FOR FIA FORMULA E RACING

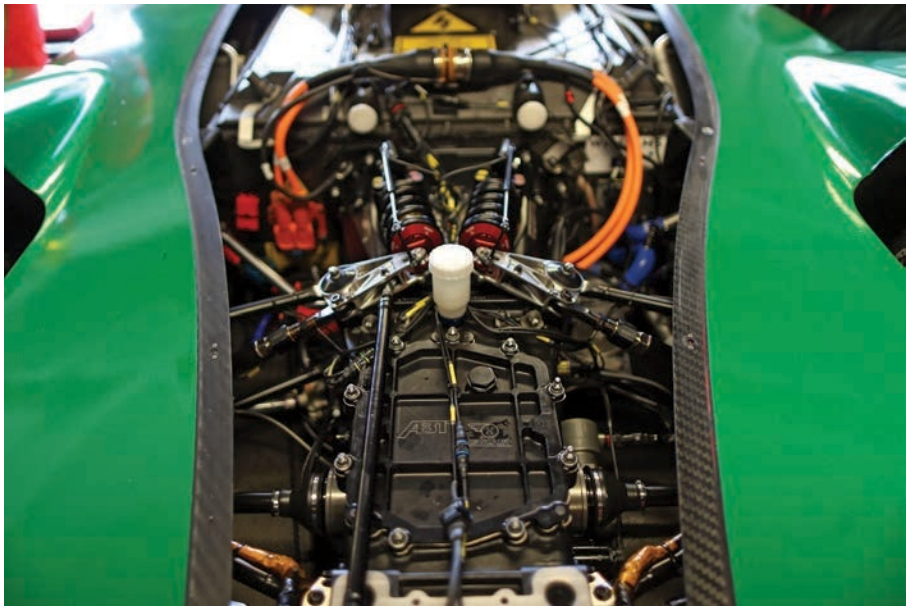
The second season of **FIA** Formula E begins in Beijing, China on October 17, 2015, with the **ABT Schaeffler Audi Sport** team's exclusive technology partner ready to demonstrate its novel all-electric powertrain.

"We did a lot of calculations because we needed to decide on one or two electric motors and the number of transmission gears. A single electric motor and a three-speed transmission in combination with the [rules-required] central differential is what we determined would be the best package for achieving optimal results," said Prof. Dr.-Ing Peter Gutzmer, Deputy CEO and Chief Technology Officer for **Schaeffler** AG.

Gutzmer and others involved in the world's first all-electric racing circuit spoke with Automotive Engineering during preseason two testing at the renowned Donington Park Racing Circuit in Castle Donington, England.

In the 2014/2015 inaugural season, all

As was the case in the inaugural season, all 40 FIA Formula E cars use the same Dallara chassis, Williams Advanced Engineering battery pack, and Michelin tires on 18-in wheels. But unlike the 2014/2015 season, teams are free to use a unique all-electric powertrain for the 2015/2016 season. The ABT Schaeffler Audi Sport car is shown during preseason testing in England.



A close-up view of the ABT Schaeffler Audi Sport team's racecar featuring the new Schaeffler electric powertrain. The image shows the electric motor and the optimized suspension.

40 carbon-fiber/aluminum monocoque chassis single-seat cars ran a standardized **McLaren Applied Technologies** powertrain on street courses in Europe, Asia, and the Americas. Although each Formula E racecar still uses a **Williams Advanced Engineering**-supplied battery with 28 kW·h of stored energy, each team could elect to run a unique powertrain in the 2015/2016 season.

Andrew Van De Burgt, FIA Formula E communications specialist, said eight of the 10 race teams chose not to stay with the season-one powertrain package that featured a **Hewland Engineering** five-speed paddle shift sequential gearbox. The eight teams opting to develop and homologate a new powertrain did so via partnering with technology specialists.

"We literally have everything from a single-speed to a five-speed transmission. Last year, the [race] starts were pretty uniform because everyone had the same transmission. Now with this vast difference in transmission technology, we could see a really big difference in the way they start," Van De Burgt said.

From a noise perspective, there's been a sonic sound shift from the first season because of the transmission and motor changes. "You can instantly tell the ABT/Schaeffler car because it's much louder than the other cars. And you can tell the **Mahindra**, **Dragon**, and **Venturi** [team] cars because they're really quiet. So there's an audible difference this year," said Van De Burgt.

The ABT Schaeffler Audi Sport team hopes to top last season's nine podium finishes with the switch to a new powertrain that spotlights an electric motor that is more efficient and provides more torque than the predecessor.

Schaeffler's electric motor drops double-digits in weight compared to the 57-lb (26-kg) **McLaren Electronic Systems**-supplied motor that propelled a 2014/2015 season racecar from 0 to 62 mph (100 km/h) in 3 seconds, according to Gutzmer. "It is a really significant weight savings. The whole system is new. But the components that we are using, including the rotor, have been approved already in other applications, [namely] commercial vehicles and motorsports," said Gutzmer.

The three-speed transmission is being produced by Hewland to Schaeffler specifications. This new manual transmission is stiffer and more compact. "We were really focused on efficiency and maximum torque, and the three-speed transmission allows much more than last season's five-speed transmission," said Gutzmer. "We think the three-speed transmission is a success factor for this powertrain."

Another focal point of the Schaeffler-developed powertrain was thermal efficiency. "If you are taking energy out of the battery and using it just for resistance in the wirings, in the motor, and in other areas, that means a loss of power in terms of what you're unable to use while driving the car. We improved the powertrain's thermal efficiency in the 3% range, and it could be up to 8% better in certain driving situations. That's a big step because it's really important to be smart about battery usage," Gutzmer emphasized.

Team ABT Schaeffler Audi Sport driver Lucas di Grassi said power management is vital. Last season each driver had 200 kW of power for qualifying and 150 kW of maximum power during a race from the Li-ion battery with maximum usable energy of 28 kW·h.

"The energy for qualifying remains the same, but we're now allowed to use 170 kW in the race, so that's a 20-kW increase over last season from the same amount of energy. So basically apart from making a motor that delivers more power, it has to be more efficient because when you accelerate, you're using more energy," said di Grassi.

Technical specialists from Schaeffler, **ABT**, and **Audi Sport** were involved in rewriting software code, according to Gutzmer. "It was done to alter the complete driving behavior of the car, and also was done to address the tuning of the transmission and the electric motor," Gutzmer said.

Di Grassi's teammate said a revised rear suspension rounds out the racecar alterations. "It starts with having a different motor and gearbox, so the connection points from the suspension change. We have different springs, different dampers, so the rear-end is all-new components," said Daniel Abt.

According to Van De Burgt, even though teams are hesitant to divulge in-depth technical details in advance of 2015/2016 racing, more information on the different all-electric powertrains is likely to be revealed as the second season progresses. "It's very, very important for us to show a trickle-down effect from the technology that's being used in Formula E to the technology that's going to be used on the road cars of the future," said Van De Burgt.

By Kami Buchholz for *Automotive Engineering*

FLEXIBLE, MODULAR ROBO-EV

Four years ago, when Germany announced that it planned to put 1 million electric cars on the nation's autobahns and roads by 2020, government ministers turned to the public-private R&D partnership **DFKI**, the German Research Center for Artificial Intelligence, to develop a road platform to support e-mobility and autonomous driving experiments.

"When we saw the government's ambitious e-mobility plan," recalled Frank Kirchner, Director of the DFKI's Robotics Innovation Center and chairman of the **University of Bremen**'s robotics department, "we said to ourselves, 'this is nothing new to us; after all, we build autonomous robots that move around on electric power. So an autonomous electric car is just a big robot to us.'" We took a chance and submitted a research proposal that we had literally scribbled down on a napkin."

The robotic center's team, which called their proposed car EO—Latin for "I go" (or "to there")—received a $1.7-million grant for a 15-month program to develop their electric smart microcar. "The EO proof-of-concept vehicle turned out to be enough to convince the funding organization to provide another half-million Euros" to build a working prototype, the EO2, which was completed in late 2014, he said.

"Since we were basically a bunch of programming and engineering nerds who spent their time typing in front of computer screens," Kirchner noted, "we had our own viewpoint. We wanted to design something that was totally different than the cars we saw on the road." So EO was conceived as a reconfigurable robot—a highly flexible and fully modular vehicle that featured multiple degrees of freedom.

The DFKI's EO2 microcar aims to fit in with cities of the future in many different ways. (Photo by Timo Birnschein, DFKI GmbH)

MAXIMUM FLEXIBILITY

The researchers opted for a distributed propulsion system comprising four in-wheel electric motors at the corners. "Distributed drive, together with a drive-by-wire system, enabled us to control the vehicle and distribute energy differently than most other cars," he explained. The lack of a large engine and transmission amid the vehicle affords maximum design flexibility. EO2 can independently turn its wheels 90 degrees and so spin in place, drive diagonally, or sideways—abilities that can be useful when driving and parking in congested urban areas, especially in cities of the future with many autonomous vehicles that are less constrained by standard human driving patterns.

Another key aspect of the EO2's design is modularity: "It lets us produce any component simpler and faster, more efficiently." The Robotic Center's team endowed the two-seat vehicle with the ability to reconfigure quickly and easily to carry more passengers or extra cargo, or to add range extenders simply by plugging rolling modules into the back of the car. They built a range-extender module to demonstrate the modular approach.

The concept's modularity extends to the ability to connect multiple vehicles to form road trains. Platooning on highways can save energy and boost range by sharing electric power among the linked cars and cutting wind resistance.

The team developed a foldable docking interface that fits into the body of the car and allows easy connection of the charging cable and for connecting dedicated plug-in modules that carry seats, additional storage room, or a power supply—battery pack, fuel cell, or generator set. "We had previously developed something similar—compatible plug-and-play linkups—for the space program," he said. The electromechanical docking interface features both inductive and direct electrical connections.

Yet another facet of the EO2 prototype's reconfigurability was the capability to change shape and alter its footprint both to improve highway aerodynamics and better fit the tight spaces in cities, all while the passengers remain seated comfortably inside. The vehicle can squat down to reduce wind resistance at speed and also rise up into a smaller footprint for parking. It shrinks from 2 x 1.5 m (6.5 x 3.3 ft) to 1.5 x 1.5 m by shifting its rear axle toward the front and sliding the body up on a set of rails."

For an extended version of this article, go to http://articles.sae.org/14194/.

By Steven Ashley for *Automotive Engineering*

SAE MEMBER CONNECTION PUTS ENGINEERING EXPERTISE ON TAP

The new online community gives SAE student members another tool with which to draw on the expertise of veteran engineers.

Got a technical challenge and are looking for an outside perspective to spur a fresh look at things?

Have we got the place for you!

SAE's newly launched Member Connection offers an open forum for the exchange of ideas that can help you overcome specific technical challenges, broaden your perspective on a limitless number of topics, help you advance your career, and link you to a wide array of people and information sources.

The online Member Connection complements an already robust member-benefits portfolio, said Matt Creech, SAE Membership Business Unit Leader. "Never before has our entire membership body, outside of SAE International events or local section events, had the opportunity to engage with their peers within or outside of their industry sector so easily," he said. "Our goal is for the Member Connection to become the premier online community for mobility engineering where our members continue to grow personally and professionally while deriving more and more value from their SAE membership."

The Member Connection is a particularly exciting benefit for SAE student members and recent graduates, said Member Connection Community Manager Lindsay Silver, "because it gives them an opportunity to connect with their experienced peers and ask the kinds of questions that you don't ask in school. Communities like this are at their most powerful when their members can connect across generations, experience levels, and demographics in order to share with one another in a collaborative environment."

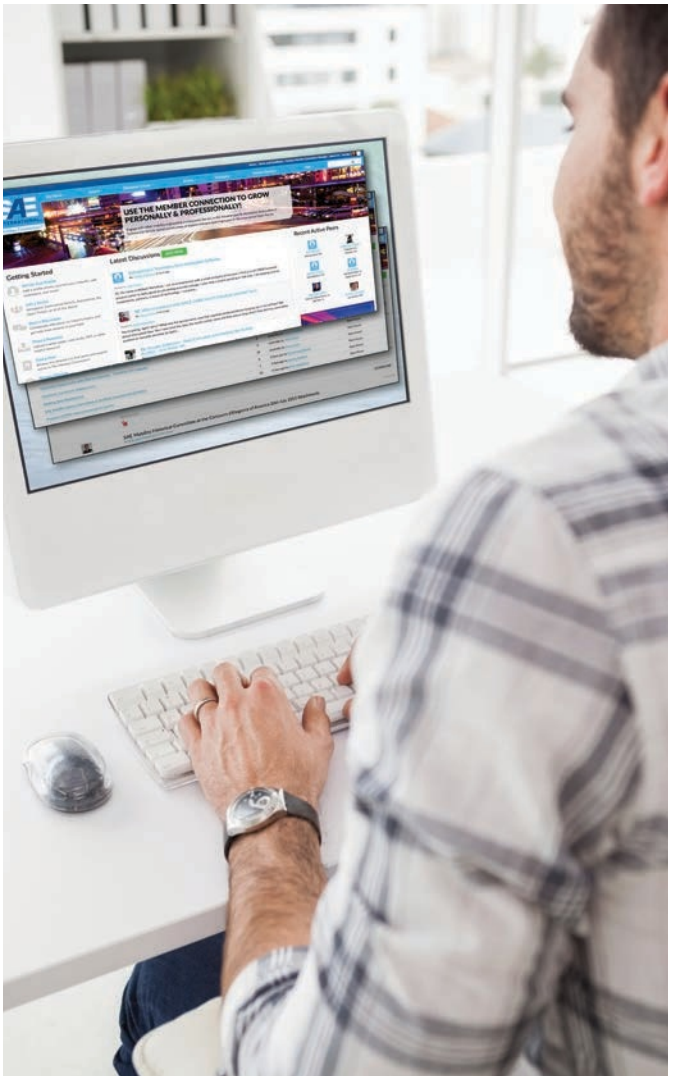
A cutting-edge community-management platform employing the latest online tools, the Member Connection will grow in value as more and more SAE members interact with it and discover its capabilities.

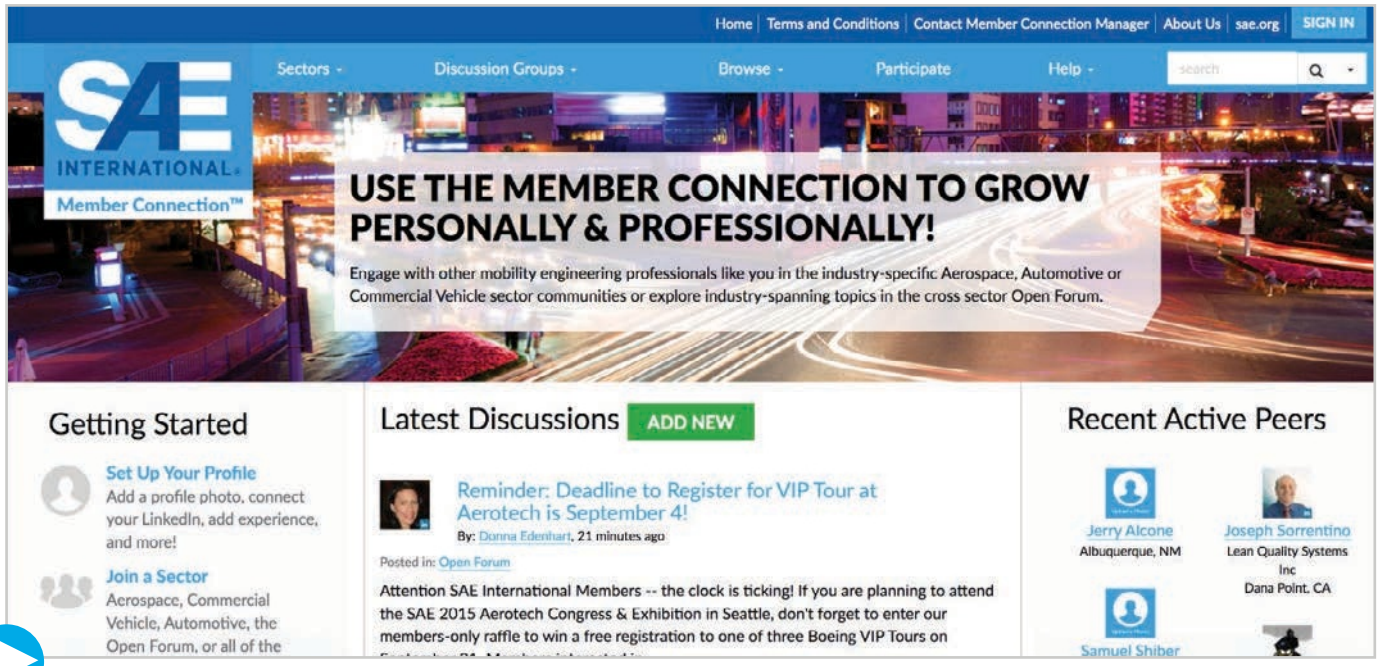
Fortunately, the level of participation in the Member Connection during its first three months has been very strong. Exemplary, in fact.

"This launch has been incredibly successful in terms of the level of activity springing up so quickly," said Silver. "Since it launched in June, the Member Connection has seen activity comparable to sites of its kind that have been around for a year or more. This rapid development bodes well for its future, as the first wave of early adopters are joined by more and more members who see the value a collaboration platform like this provides."

More than 1,000 discussion posts have been entered by more than 350 unique posters. On an average day, between 100 and 150 members log onto the site.

SAE members should think of the community as a "massive





Readers of the digital version of *MOMENTUM* can click the icon at left for a virtual tour of the Member Connection.

help line" peopled by more than 45,000 fellow mobility engineers who have an enormous collective body of knowledge to share in helping each other resolve "whatever quandaries might be bugging them," Silver said.

The nature of networking and information-sharing within organizations, and within industries, has changed over the past decade or so. This presents challenges in collective cohesiveness, said Silver. "The Member Connection will reinvigorate for some, and reinforce for others, the sense of togetherness and mutual aid that is really the meat of what associations are supposed to be for an industry."

One of the most active participants in the Member Connection is Jerry Alcone of Albuquerque, an engineer who has worked for multiple companies in multiple industry sectors. "I am looking for interaction with peers and to be exposed to the different ideas and problems that people bring up," he said. "So the Member Connection offers a wide-ranging forum to discuss ideas, problems, and solutions. I enjoy being exposed to neat problems and having a chance to discuss them with my peers."

NUTS AND BOLTS

All SAE members receive daily email messages from the Member Connection highlighting the newest comment threads on the site. Members can log on to the site to review or participate in the discussion threads, but the emails are a way to see what the threads are before (or instead of) logging on. "It's like a miniature newsletter," Silver said of the email alerts. Members can also reply right from an email to add to a discussion. The site is mobile-friendly for whatever devices members use.

Because it is linked with SAE's internal customer-management system, the Member Connection automatically subscribes SAE members and produces a very basic profile of them. Creech said it's important for members to go into the site and add more detail (job history, interests, etc.) to their Member Connection profile.

"Updating this profile information is extremely easy. Members can even import their LinkedIn profile if they wish," he said. "We also want members to upload profile pictures. It is always fun to see who you are interacting with, and this small step—adding a photo—will help further the great sense of community shared by mobility professionals and students in the Member Connection."

Member Connection uses profile information to assign participants to industry segments and certain communities and subcommunities. Additional subcommunities will be formed as the participation level grows.

SAE launched Member Connection with a handful of discussion groups, the idea being that additional communities will be rolled out as members become familiar with the functionality of the site. "You don't want to try to do too many things at first," said Silver. "There's a lot of runway left."

For example, a recently launched Member Benefits Discussion Group enables members to post questions to the SAE Membership Team, download helpful information regarding their benefits, learn about members-only exclusive opportunities, and much more. Another helpful feature scheduled to launch in the near future is a volunteer module that will help match interested members with available volunteer opportunities.

There are already communities set up for the Aerospace, Commercial Vehicle, and Automotive Sectors; these bring SAE members and volunteers together to discuss standards. ■

By Patrick Ponticel, *MOMENTUM* editor

GEAR

WIRELESS MEDIA HUB

In a follow-up to its popular MediaShair Wireless Medi Hub, **IOGEAR** has announced the new MediaShair 2 Hub featuring a faster processor and double the Wi-Fi speed over the previous generation. It allows movies, photos, and large documents to be wirelessly accessed from up to seven devices through its own secure Wi-Fi network, including a free and easy-to-use downloadable app for both iOS and Android products. Priced at $99.95, MediaShair 2 Hub provides access to external storage devices such as USB Flash drive, external hard drive, or SD card. Weighing 0.25 lb (0.11 kg), the unit can play files larger than 4 GB in size, and multiple users can access the same files without compromising viewing quality, such as sharing pictures taken from a camera. A built-in battery lasts up to nine hours between charges. Beyond its wireless access capabilities, the MediaShair 2 Hub can become a portable power station by plugging a charging cable into the USB port.

SCANNER FOR PAPERLESS LIFE

Visioneer Inc.'s duplex document scanner, called Visioneer RoadWarrier 4D for Windows and Mac, is about the size of a rolled-up magazine and weighs a little more than a small bottle of water. The mobile scanner does its job in only 8 s. It is powered through a computer's USB port, allowing it to be used where ac power is unavailable or incompatible. The $149.99 unit scans paper or hard plastic cards as small as 1.5 in (38 mm) and documents up to 8.5 in (215 mm) wide and 32 in (810 mm) long.

WRISTBAND COMMUNICATION FOR SPORT AND LEISURE

Sena Technologies Inc.'s Wristband Remote is the latest addition to the company's line of Bluetooth communication systems specially designed to give users full control over their Sena Bluetooth gear. By attaching the device to the wrist or arm, the Wristband Remote helps reduce the dangers caused by distractions while participating in activities beyond motorcycle and powersports, to include such things as skydiving, paintballing, snowboarding and skiing. With a retail price of $99, the Sena Wristband Remote features world-class 4.1 Bluetooth technology for clear, crisp and reliable communication and can be paired with any Sena Bluetooth 4.0 and above Smart Ready-enabled headsets such as the 20S, 10U, 10R, and 10C, the world's first combined communication and audio action camera system. The Wristband Remote is water-resistant and offers glove-friendly buttons and joystick for easy-to-use operation. With its long-life battery, the device can be used for up to three months between charges.

SOUND-ISOLATING EARPHONES

Shure Inc.'s SE215 sound-isolating earphones feature Dynamic MicroDriver and a detachable cable. Available in clear or translucent black, the earphones offer detailed sound with enhanced bass, and their design delivers outstanding isolation. The SE215 Earphones are particularly suited for live performance and critical listening and have a small, comfortable design. Along with the company's other earphone models, the SE215 features a detachable cable with wireform fit. The durable, Kevlar-reinforced cable allows for easy replacement or customization. It also significantly extends the life of the product and offers a more comfortable, secure fit.

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October 30 Deadline

This award recognizes an outstanding middle school teacher or teachers who have creatively utilized the A World In Motion (AWIM) program. Learn more and submit your nomination: http://awards.sae.org/dickinson/

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SAE values and appreciates the time you spend completing a nomination. If you need any assistance, please contact the SAE Awards staff at awards@sae.org, or SAE Customer Service at +1.877.606.7323 (U.S. and Canada only) or +1.724.776.4970 (outside U.S. and Canada).

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