2017 SAE Battelle CyberAuto Challenge™ Frequently Asked Questions (FAQs)
August 6-11, 2017
Macomb County Community College,
Sports & Expo Center, P Building, South Campus
14500 E. 12 Mile Road, Warren, MI
Revised November 30, 2016 (Subject to Change)

1. **Why was the CyberAuto Challenge established?**
   The CyberAuto Challenge, since its inception in 2012, has sought to be a resource to the automotive industry by providing a confidential environment to explore cyber issues as a community of industry, government, academics, researchers and students. It has ignited interest in the automotive industry among "cyber-centered" college and high school students and provided a neutral forum at which engineers from different manufacturers can discuss common issues and help resolve common challenges. It has also served to facilitate collaboration among engineers from different organizations to form the germ of a topical community of interest. The Challenge has served as an exemplar that the automotive community:
   - takes cybersecurity seriously
   - is engaged on an ongoing basis to understand the risks
   - is keeping the core auto engineer well connected to the cyber community
   - is developing an auto cyber community of interest
   - is developing an auto cyber workforce pipeline

2. **What is the CyberAuto Challenge and what goes on during the week?**
   The Challenge is a week-long (5 day) practicum based workshop — a series of classroom lessons and discussions alternating with hands-on work exposing high school and college students to real cars, real equipment, real communications protocols, and real industry experts.

   Curriculum starts with an introduction, a legal briefing, and an ethics briefing. Technical courses follow on Tuesday and Wednesday which include topics such as CANBUS, electrical vehicle architectures, principles of reverse engineering, automotive data forensics, telematics, analysis of attack surfaces, etc. Tuesday afternoon is usually dedicated to a "field trip" to a local relevant location, and then followed with a "mixer event" and a keynote speech. On Thursday afternoon, we initiate an "all night Hackathon" in which teams conduct assessment activities on provided automotive learning platforms (cars). The teams present their results in a confidential briefing to Challenge team members only on Friday morning, and then there is a reminder course regarding ethics and legal matters and then some wrap-up procedural activities and conclude with lunch on Friday.

3. **What is the value to the auto industry?**
   Development of a highly capable cyber workforce is critical for the success of the automotive industry and the Challenge's value proposition supports the auto industry's objectives to:
   - Attract the brightest minds to consider careers in the automotive industry to effectively compete with other high tech industries for talent.
   - Raise awareness regarding the industry's efforts to incorporate security solutions from the first stages of design ("security by design") by working collaboratively with businesses, government and academia to enhance cybersecurity.

- Improve the auto industry's reputation as a high tech industry.

The Challenge creates an environment in which engineers from different backgrounds, industries, and organizations can jointly consider both immediately practical and theoretical problems as well as participate in sessions moderated by leading cybersecurity experts. As a result, the Challenge provides opportunities to explore and discuss issues with peers and experts that are simply not possible within the traditional automobile company. When the engineers from different organizations jointly work on projects, and jointly engage in mentoring college and HS students, it forms a very rich basis for meaningful dialogue and the avenue for new ways of looking at problems (because the HS and college students will have lots of ideas, will challenge long-held notions, and literally require that everyone look at things with fresh eyes). As the engineers across the automotive industry's cybersecurity domain of concern work together and build relationships among themselves, the strength of the industry and its body of knowledge flourishes. Moreover, the engineers have the opportunity to work with great students and identify possible intern or full-time workers for the future.

The 2017 Challenge's value to the auto industry is achieved through the development of three success factors:
1. a highly interactive, participatory program
2. a relevant, high quality practical learning curriculum
3. methods to attract the brightest students

4. **Who participates in the Challenge?**
The SAE Battelle CyberAuto Challenge seeks to compose teams which have an equal ratio of working professionals to students, and embody many different points of view—from automotive manufacturers to the Department of Transportation, Department of Homeland Security, and Department of Defense, to different research organizations, and students at different levels and with slightly different technical backgrounds. Teaching is not lecture-based and this is not going to be the kind of environment in which everyone has the same background and training. Carefully chosen, highly competent participants interface openly with everyone else on their team. Everyone can learn something from everyone else, and the nature of the coursework and practicum will stress intra-team interactions.

Team composition is made up of high school and college students, OEM and supplier engineers, government representatives (e.g. DOT, DOD, and DHS), STEM educators, and security researchers ("white hat" hackers). The typical team composition is:

2-3 Auto Company (OEM) engineer(s)
1-2 Supplier engineer(s)
1 STEM educator
1 Government engineer
1 Academic researcher (or white-hat hacker)
4 College students
4 High-school (HS) students
1 Facilitator

Visitors are invited to attend lectures and keynotes of general interest. They are usually senior managers and government officials. Their visit helps to promote the benefits of the Challenge and to obtain their organizations' support of future Challenges. Visitors are approved by SAE.

Media do not participate in the Challenge. Members of the media are carefully selected by the Challenge Officers and invited to attend lectures or keynotes of general interest. Media are always escorted by Challenge staff and not allowed in the vehicle area.

5. **How is SAE International involved?**
Battelle established the CyberAuto Challenge in 2012 and nurtured the event for three years. In April 2015, Battelle transferred ownership of the Challenge to SAE international. The automotive industry has relied on SAE for over 100+ years to support the development of its future workforce. This intersection of students and engineers is perfectly aligned with SAE's objectives in science, technology, engineering and math (STEM) education and life-long learning for automotive professionals.

In 2015, the name of the event changed to the "SAE Battelle CyberAuto Challenge" in acknowledgment of SAE's leadership.

6. **How is Battelle involved for 2017?**
Battelle established the CyberAuto Challenge in 2012 and nurtured the event for three years. Battelle is committed to continuing its support by providing planning experience and security subject matter experts.

7. **How is Macomb Community College involved?**
Macomb Community College (MCC) is hosting the Challenge at Sports & Expo Center, 14500 E. 12 Mile Road, Warren, Michigan on Monday, August 7 through Friday, August 11, 2017.

8. **How is Michigan Economic Development Corporation (MEDC) involved?**
As part of the State of Michigan's automotive and defense cyber strategy, MEDC is engaging many Michigan institutions, businesses and organizations to assist in the planning and support of the Challenge. MEDC is working to increase the number of Michigan students and businesses involved with the Challenge with the goal of establishing Michigan as the center for cyber-auto and cyber-defense talent.

9. **How is SquareOne Network involved?**
SquareOne Network has deep experience in providing K-12 students opportunities to pursue technology oriented careers through authentic, hands-on science, mathematics and engineering opportunities. SquareOne's extensive Michigan connections help to support MI Governor Snyder's desire to increase the number of Michigan students for the 2015 Challenge.

10. **How many people participate in the Challenge?**
 In 2016, 192 people attended the Challenge,
Sixty-eight individuals participated for the entire Challenge week as members of vehicle teams.

11. **Who are on the vehicle teams and how many individuals are on a team?**
The Challenge forms teams with an equal ratio of working professionals to students. Teammates have diverse perspectives – from automotive manufacturers and suppliers, to government representatives (e.g.

DOT, DOD, and DHS), STEM educators, and security researchers ("white hat" hackers) – as well as different technical backgrounds. Coursework is designed to maximize intra-team interactions and relationship building. Students experience real professional teamwork at play, and professionals learn from the unencumbered ideas of students. All teammates benefit from mentor-protégé relationships.

Approximately 16 people make up a team. Each team works together for the entire week on the same vehicle.

Team Composition – 16 members
4 High-school (HS) students
4 College students
2-3 Auto Company (OEM) engineers
1-2 Auto Supplier engineers
1 Government engineer
1 Academic researcher (or white-hat hacker)
1 STEM educator
1 Facilitator

Professional Team Member Roles and Expectations
Each team member plays a crucial role, with each individual bringing their knowledge, perspective and experience to create a positive learning environment.

OEM Engineer:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- Is "Vehicle Owner" for the team and is ultimately responsible for vehicle
- Serves as the ultimate industry technical expert for the provided vehicle - does not need to be a cyber expert, but must be an engineering expert for the platform (developer or engineer)
- Guide student exploration without spoon-feeding them; creating a positive learning environment for students
- Technically describe what the things the students are "seeing" on a vehicle mean, so they can better learn the system
- Sufficient interpersonal skills to work with the different cohort members (Government, Suppliers, Academia, Students, and Hackers)
- Sufficiently comfortable with hackers / researchers for a constructive rapport with them during the event
    Benefits for the OEM Engineer:
    - o Develop future talent pipeline for automotive industry
    - o Raise awareness of high tech automotive job opportunities
    - o Develop and deepen automotive (supplier) engineer, researcher and government peer to peer relationships
    - o Develop a cyberauto "community of interest"
    - o Personnel recruitment / internship opportunity

Supplier Engineer:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- Technical engineering expert: developer, designer, QA engineer, electrical engineer, etc.
- Direct knowledge with 1+ ECUs in modern vehicles

- Direct knowledge of how the ECUs perform in system
- Assist cohort/team with technical knowledge and help OEM engineer with specific module technical issues
- Technically describe what the things the students are "seeing" on a vehicle in their area of knowledge, so students can better learn the system
- Works well with students as well as other professionals; creating a positive learning environment for students
  Benefits for the Supplier Engineer:
  - Develop future talent pipeline for automotive industry
  - Raise awareness of high tech automotive job opportunities
  - Personnel recruitment / internship opportunity
  - Develop a cyberauto "community of interest"
  - Develop and deepen automotive (OEM) engineer, researcher and government peer to peer relationships

Government Participant:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- A government expert in one of the following fields: engineering, R&D, policy, administration, operations; normally from DOD, DOT, or DHS at Federal; State government personnel determined by the State.
- Watch and interact with team dynamics; assisting in creating a positive learning environment for students
- Contribute in area of expertise; help to technically describe things the students are "seeing" on a vehicle, so they can better learn the system
- Use the event to inform within capacity and/or function of government (e.g. if a policy expert participating in the event, explaining how assessing level of effort to achieve certain results and understanding learning curves can help inform policy)
  Benefits for the Government participant:
  - Develop and deepen automotive (OEM/supplier) engineer and researcher peer to peer relationships
  - Develop future talent pipeline in cybersecurity (ensuring a well-trained and educated workforce)
  - Develop a cyberauto "community of interest"
  - Raise awareness of high tech cybersecurity jobs
  - Personnel recruitment / internship opportunity

Researcher / Hacker:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- A security researcher ("White Hat"), can be from industry, government, or academia
- Ideally with direct automotive experience, but general IT will suffice
- Must have actually successfully breached a defended system (this is practicum, not theory - we want people who can break in)
- Understands common security approaches and vulnerability assessment techniques, etc.
- Willing and able to coach, helping both the students and professionals by showing tricks of the trade and helping them to understand the attacker's perspective
- Expected to take a leadership role during Thursday (not a dictator, but this is really the day researchers/hackers to show the process/technique/etc. of an attack or assessment.

Benefits for the Researcher:
- o Develop and deepen automotive (OEM/Supplier) engineer and government peer to peer relationships
- o Develop a cyberauto "community of interest"
- o Develop future talent pipeline in cybersecurity
- o Raise awareness of high tech cybersecurity jobs
- o Personnel recruitment / internship opportunity

STEM Educator:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- Acts as teacher, counselor, and "coach" for students; primarily focused on HS student involvement and growth
- Able to stand in and provide additional instruction, as needed, to a HS student
- Must be technically capable with CS, engineering, or math background; automotive experience a favorable option
- Must stay housing with students and act as supervisor during off-coursework times
- Understands each facility's emergency procedures and acts as the team's "captain" in case of an emergency (attendance and assembly area)
- Expected to take advantage of learning moments and use some evening time to either prepare for the next day or review critical items from past days
- Expected to take a strong position in developing the final report (which is from the HS and college student perspective)
- Responsible for attendance of students (HS & College) - determining if they are all present in the morning, after any movement to/from the facility (especially Tuesday afternoon off site activity), and following any breaks
- Responsible for ensuring HS & College students return to dorms (are boarded on bus/transport)
- Able to assist in work-ahead modules to prepare students for the event (normally this work ahead on-line instruction is held from March - May)
- Able to assist in final HS student selection based on students' demonstrated capabilities during the work ahead period (prior to Challenge week)
- Able to provide feedback on draft instructor presentations (prior to Challenge week) to ensure the message and instruction is appropriate for HS students (as well as the rest of the cohort - this event is intended to "stretch" everyone)

Benefits for the STEM Educator:
- o Develop a deeper connection between secondary and post-secondary classroom courses and real world application of concepts
- o Develop future talent pipeline in cybersecurity and in the automotive industry

Facilitator:
- Participate on the team for the entire week (Sunday late afternoon through Friday)
- Acts as team member advocate
- Keeps the team on time per the schedule; handles logistical issues for the team
- Responsible for organizing the final report/presentation for Friday morning
- Responsible for ensuring the notebooks and work products are captured at end of course (to then hand over to SAE Challenge Staff)
- Interacts well with HS and College students

- Works well with students as well as other professionals; creating a positive learning environment for students
- Technical capabilities nice, but not critical
- Optionally can perform technical tasks, too
- Coordinates with Point of Contacts (POCs) at Delphi and the SAE Challenge staff to help work through logistical issues
  Benefits for the Facilitator:
    - Develop and deepen automotive (OEM/supplier) engineer, researcher and government peer to peer relationships
    - Develop future talent pipeline in cybersecurity and in the automotive industry

12. **What is the same year to year?**
    The founding mission of the Challenge remains the same – helping to forge a new discipline of Automotive CyberSecurity Engineering by:
    - Creating awareness of cybersecurity issues relevant to the consumer automotive industry
    - Facilitating collaboration among industry, government and academia
    - Attracting high school and engineering college students to choose careers in the automotive industry; specifically cybersecurity
    - Improving the skills and knowledge of the current automotive professional workforce in cybersecurity

    The format and flow of the Challenge remains the same – a 5 day practicum for vehicle teams comprised of students, auto engineers, government, academia and security researchers. Students will be required to complete pre-course work and then a selection process is conducted by a group of STEM educators to invite the brightest minds from high schools and colleges to participate. As in past years, a selected number of guests will be invited to observe the instructional portions and social activities of the Challenge enabling SAE to broaden the support and expand the program in the future.

13. **Cybersecurity is a sensitive topic for the automotive industry. What confidentially protocols are in place?**
    SAE continues to be keenly aware of the high level of media attention regarding automotive cybersecurity, which could call the confidential environment of the Challenge into question. SAE is dedicated to providing a safe and confidential environment for all participants – before, during and after the Challenge. To that end, SAE has developed a set of protocols for participants to follow. The protocols clarified the past practices and expanded the expectations for all Challenge participants in 2015 and going forward. All Challenge participants receive a copy of the Information Sharing Protocols and signed Terms of Participation agreements, affirming "What happens at Challenge, stays at Challenge."

14. **What if something is discovered on a vehicle during the Challenge, how is it handled?**
    OEMs provide the "Learning Platform" (the vehicle) which teams use during training and exercises. Any team findings are debriefed (verbally) by Challenge officers and by SAE legal. The team OEM engineer or representative is present during these debriefings and will help guide the discussion. No visitors or media are present during these briefings. Individual and organizational non-disclosure agreements (NDAs) will then be reviewed and restated. In the event that an OEM would like to highlight the result, they can request that SAE waive the particular NDA provisions for a specific and narrowly stated disclosure, but ONLY the OEM can make such a request to relax the Challenge's non-disclosure policies.

15. What happens to vehicle data capture and data logs at the conclusion of the week?
OEMs provide the "Learning Platform" (the vehicle) which teams use during training and exercises. The OEM providing the Learning Platform is the sole owner of all results and logs associated with their platform, and also receives all written notes regarding the platform. SAE erases data from all computers (SAE provides the computers used during the Challenge) and then low-level formats all the hard drives to ensure residual data deletion.

16. Are the results of the Challenge published?
No, the results of the Challenge are not published. The OEM providing the Learning Platform is the sole owner of all results and logs associated with their platform, and also receive all written notes regarding the platform. SAE erases data from all computers (we provide the computers used during the Challenge) and then low-level formats all the hard drives to ensure residual data deletion. Any team findings are debriefed (verbally) by Challenge officers and by SAE legal. The team OEM engineer or representative is present during these debriefings and will help guide the discussion. No visitors or media are present during these briefings.

While specific results will not be published, SAE will create and publish materials, per the information sharing protocols, articulating the value and benefits of the Challenge for promotional purposes.

SAE will publish and confer a "certificate of merit/completion" for students to include on their resumes.

17. How is the Challenge funded?
For the first three years (2012-2014) Battelle invested and fully funded the Challenge. As the Challenge matured, the industry is now supporting the event through sponsorships and contributions. In April 2015, ownership of the Challenge transferred to SAE. SAE is seeking support through sponsorships to create an immersive, relevant learning environment in the development of the future cyber auto workforce. Sponsorships will help offset expenses associated with this event including curriculum development, course training materials, hardware kits, computer stations, software licenses, student accommodations, meals, transportation, and other tools necessary to participant in the Challenge.

We are looking for OEMs to provide:
• a current production vehicle to utilize as a learning platform
• 2-3 OEM engineers as team members for the entire week
• a technical expert to teach an on-site course
• sponsorship support

We are looking for suppliers to provide:
• 1-2 supplier engineers as team members for the entire week
• a technical expert to teach an on-site course
• sponsorship support

We are looking for other organizations to provide:
• technical experts as team members (e.g. facilitators, researchers) for the entire week
• a technical expert to teach an on-site course
• sponsorship support

18. What types of expenses does the Challenge incur?
In 2016, about 50% of the expenses were dedicated to developing an intensive, immersive and relevant course work, lectures and experiences. Logistics accounted for 38% consisting of computer rental, cabling, A/V, lighting, tools, tables and chairs. Lodging, meals and transportation was 11% and security, registration, insurance and legal fees accounted for 2%.

19. What are the sponsorship opportunities?
We are looking for the industry to support the Challenge to create an immersive, relevant environment for learning in the development of the future cyberauto workforce. Sponsorships were new for 2015, they helped to offset expenses associated with this event including course development, student accommodations, meals, transportation, learning materials, hardware kits, and other tools necessary to participant in the Challenge.

SAE can provide a menu of sponsorship opportunities for OEMs, suppliers and other organizations to consider.

20. Are contributions and sponsorships tax deductible as a charitable donation?
SAE International is an IRS 501(c)(3) charitable organization. The following represents SAE's understanding of the tax law but is not meant to be tax advice. You should consult your accountants/tax advisor with any questions you may have. By definition, a corporate sponsorship is a payment to a tax-exempt organization by a payer engaged in a trade or business, provided that the payor does not expect any substantial return benefit. The use or acknowledgment of the payor's name, logo, or product line in connections with the activities of the tax-exempt organization is not considered a substantial benefit. With this definition, a payor's treatment of the payment is going to depend upon their intent. If the payment is made with a charitable intent, then a charitable deduction under Section 170 would probably be allowed (again, you will need to consult your tax advisor). If the payment is made as an ordinary and necessary trade or business expense, you should be able to take it as an ordinary deduction (practice development, advertising) under Section 162.

21. How many teams will participate in the Challenge?
In 2016, the four (4) teams participated. We anticipate four (4) teams for 2017. The number of teams is determined by the number of vehicles donated.

22. Is there a limit to the number of teams?
Yes, for 2017 the Challenge is limited to a maximum of six (6) teams. The limiting factors are the number of vehicles provided as well as the space and resources required at the facility. Since interest is high, expansion is planned for the future.

23. Who selects members for each team?
OEM engineers will work on the vehicle provided by their organization. The Challenge officers will select other members of the team in consultation with the OEM vehicle owner. OEMs are encouraged to recommend suppliers which provide product for their vehicles. Challenge officers will invite and confirm the other team members.

24. Does the instructional course work change each year?

Somewhat, a few different subjects are included based on new areas of concern for the industry. In 2016, we are looking to include topics on wireless, over the air updates and virtual modeling. However, fundamentals like CANBUS, software and hardware hacking, forensics and reverse engineering are taught each year to serve as a good base of knowledge for the development of the future cyber auto engineer.

25. How are students recruited?
SAE is leveraging its network of faculty members at major US universities.
- High School – we rely on outreach through the school system. We present information about the Challenge to administrators and teachers (and, when possible, through State Departments of Education). Individual instructors subsequently nominate some of their highest aptitude students for the course.
- College – we work with schools and professors whose programs align with the goals and conduct of the Challenge and recruit both undergraduate and graduate students who are both high-aptitude and who can help be a mentor figure to the high school students.

Students submit a resume or letter about their interests and skills with their teacher's or school administrator's recommendation to cyberautochallenge@sae.org.

26. How are students selected?
Each student candidate must have a cognizant person (teacher, school administrator, coach, pastor, scout leader, etc.) provide an email or memo attesting to the strong ethical character of the candidate. Each student candidate must enroll in and complete preparatory educational course work and screening sessions on-line (during April - June) that teaches and measures progress on topics such as cryptography, automotive communications protocols, and programming basics. The top scoring students are invited to attend the Challenge.

27. Who develops the student pre-work?
A STEM education organization develops and coordinates the preparatory course work for students. Students will work through these materials in advance to prepare for the intensive on-site program. Their progress in completion of this pre-work is used as part of the final selection criteria for selecting participants from the many applicant students.

28. What types of subjects are students required to know before Challenge Week?
There is some variation in on-line coursework each year which reflects the changing nature of some of the electives taught on-site during Challenge week. Core courses, however, are always taught and evaluated. These core courses are Linux and CANBUS. Examples of other coursework include cryptography, fundamentals of engine design, secure coding practices, microcontrollers, and embedded development. On-line qualification for students is the final selection criteria used for selecting participants from the many applicants.

29. Are automotive technical experts involved in teaching any of the courses?
Involvement of automotive professionals and their knowledge is an important component of the Challenge. We are seeking industry professionals to deliver lectures on relevant cybersecurity and connected vehicle topics. Those interested in teaching or lecturing at the Challenge should contact SAE.

30. What will students receive at the completion of the Challenge?

SAE confers a "Certificate of Achievement" for students to include on their resumes.

31. **How much does it cost for a student to participate?**
    The Challenge is free for the student. We do not want students' economic situation to dictate attendance. Attendance is merit based. Meals, lodging and local transportation are provided. Students are responsible for getting either to Detroit Metropolitan Wayne County Airport (DTW) where a shuttle will them pick up, or to registration site on Sunday, August 6, 2017.

    Parents are welcome to accompany their student on Sunday, August 6th for registration and orientation and on Friday, August 11th for lunch and closing graduation.

    All other attendees are expected to make their own arrangements for lodging and transportation to/from the Challenge.

32. **How much does it cost for a professional to attend?**
    The Challenge is free for invited professionals. We expect professionals to make their own arrangements for lodging and transportation. SAE is seeking sponsorships and contributions from participating OEMs and suppliers as well as other interested organizations to support the Challenge.

    SAE, in consultation with OEMs providing vehicles, will invite and confirm professional team members. Team composition is made up of high school and college students, OEM and supplier engineers, government representatives (e.g. DOT, DOD, and DHS), STEM educators, and security researchers ("white hat" hackers). OEM engineers will work on the vehicle provided by their organization. OEMs are encouraged to recommend suppliers which provide product for their vehicles. The Challenge Officers will invite and confirm other members of the team with consultation with the OEM vehicle owner.

33. **Will media (reporters, journalists) be in attendance?**
    Media do not participate in the Challenge. Members of the media are carefully selected by the Challenge officers and invited to attend lectures or keynotes of general interest. Media are always escorted by Challenge staff and not allowed in the vehicle area.

    SAE or one of the automobile trade associations (e.g. Auto Alliance or Global Automakers) may plan a media event in conjunction with the Challenge to make a related industry announcement. Media are not allowed in the Challenge area.

34. **Who are the Challenge officers?**
    Marc LeDuc, SAE International, O: 248 273 4085, M: 248 410 8523, marc.leduc@sae.org
    Karl Heimer, AutoImmune, M: 410 900 5345, karl.heimer.pro@gmail.com, karl.heimer@autoimmune.io
    Rob "Deker" Dekelbaum, AutoImmune M: 240 882 5288, deker@autoimmune.io

35. **SAE contacts?**
    Main SAE Contact: Marc LeDuc, marc.leduc@sae.org, O: 248 273 4085, M: 248 410 8523
    Sponsorship Opportunities: Linda Wagner, linda.wagner@sae.org, O: 724 772 406, M: 724 553 2469