

SAE INTERNATIONAL

# SAE BATTELLE CYBERAUTO CHALLENGE

## JULY 13-17, 2015

Student recruitment



# Today's agenda

1. About us
2. What is the Challenge?
  - History
  - Value Proposition
3. What should participants expect?
  - Environment
  - How much does it cost?
4. Special Challenge considerations
5. Student qualifications
6. Timeline
7. How to nominate a student

# About us

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# 2015 SAE Battelle CyberAuto Challenge

## About SAE

SAE International is a global association committed to being the ultimate knowledge source for the engineering profession. By uniting over 145,000 engineers and technical experts, we drive knowledge and expertise across a broad spectrum of industries. We act on two priorities: encouraging a lifetime of learning for mobility engineering professionals and setting the standards for industry engineering. We strive for a better world through the work of our philanthropic SAE Foundation, including programs like A World in Motion® and the Collegiate Design Series™. [www.sae.org](http://www.sae.org)

## About Battelle

Every day, the people of Battelle apply science and technology to solving what matters most. At major technology centers and national laboratories around the world, Battelle conducts research and development, designs and manufactures products, and delivers critical services for government and commercial customers. Headquartered in Columbus, Ohio since its founding in 1929, Battelle serves the national security, health and life sciences, and energy and environmental industries. [www.battelle.org](http://www.battelle.org).

## About Square One Education Network

The Square One Education Network's purpose is to create and fund powerful, relevant experiences for K-12 teachers and students that creatively integrate science, technology, engineering, and mathematics (STEM) using best practice supported instruction through unique project designs.

We support hands-on STEM initiatives, host unique professional development, and provide engaging STEM projects throughout the Great Lakes region. Our signature event is the [Innovative Vehicle Design](#) Challenge held at Michigan International Speedway. [www.squareonenetwork.org](http://www.squareonenetwork.org)

# What is the CyberAuto Challenge?

# 2015 SAE Battelle CyberAuto Challenge

The Challenge is a week-long (5 day) practicum based workshop — a series of classroom lessons and discussions alternating with hands-on work with real cars, real equipment, real communications protocols, and real industry experts including automotive engineers, government engineers, and ethical “white hat” hackers. Teams perform analysis and provide input on current model full-feature cars.



*Supported by:*



***Forging the next generation auto cyber engineer***

# History

- **Created by Battelle and the Founder of Center for Advanced Vehicle Environments (CAVE) Karl Heimer, now founder of AutoImmune**
- **Motivated by the progress in embedded technologies in automobiles & increased connections – cellular, WIFI, Bluetooth, OnStar, DSRC, Satellite radio, etc.**
- **Need for a tailored curriculum to support cybersecurity auto issues; portions of electrical engineering, mechanical engineering and computer science plus other professions**

**Aug 2012 Aberdeen Proving Grounds (Maryland)**

**July 2013 Ohio State University Center for Automotive Research (Columbus, Ohio)**

**July 2014 Delphi Headquarters, Troy MI (Detroit Metropolitan area)**

**July 13 – 17, 2015 Delphi Headquarters, Troy, MI (Detroit Metropolitan area)**

**In 2014: 110 attendees -- 30+ students, 30+ professionals from OEMs, auto suppliers, government agencies (DoD, DoT), 5 “white hat” hackers, 5 STEM educators, plus visits by several automotive management leaders, e.g. Security Directors**

**Dec 2014: SAE International partners with Battelle to lead 2015 SAE Battelle CyberAuto Challenge**

# Value Proposition

- Awareness of relevant automotive cybersecurity issues
  - Increased vehicle electrical/electronic system complexity
  - Increased number of interfaces – wireless and wired
- Cooperative relationship building
  - Collaboration among students, industry, gov't, academia fostering mentor – protégé relationships
- Workforce development
  - Exposing high school and college students to high tech careers in auto industry
  - Improving current auto engineer cybersecurity skills and knowledge
  - Intern / employee recruitment



# 2015 SAE Battelle CyberAuto Challenge

## Real vehicles; real problems

- 5 day camp / workshop; classroom discussions complemented by hands-on vehicle work
- Teams composed of OEs, suppliers, government, researchers-“white hat” hackers, educators
  - Equal number students to professionals
- Extensive on-line student preparation (cryptology, microcircuit design, etc.)
- Tuesday tour and networking event at a relevant local destination
- 24 hr. Challenge - practicum
- Proposed for 2015
  - Virtual vehicle model
  - Information sharing pilot; table top exercise



# What to expect

## Immersive in Nature

- Maximize group interactions
- Avoid environmental distractions
- Focus on learning
- Focus on collaborative teaching & engagement
- Provide basic instruction, then continuously facilitate
- Hands-on with real cars, real problems



***Why? stress + fun + interesting problem = camaraderie***

## Team Composition – 16 members

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



***Students working as part of a diverse professional team***

# 2015 Preliminary Schedule

## 2015 SAE Battelle CyberAuto Challenge™ -- Preliminary Schedule

**April 24- May 30**

Students complete online preparatory course work

- **Fast paced**
- **Highly interactive**
- **Long days- especially Thursday 24 hr. "hackathon"**

	12-Jul Sunday	13-Jul Monday	14-Jul Tuesday	15-Jul Wednesday	16-Jul Thursday	17-Jul Friday
0700		Transportation	Transportation	Transportation	Transportation	
0730		Breakfast	Breakfast	Breakfast	Breakfast	
0800		Introduction - SAE & AutoImmune		Infotainment / Telematics (Digital Forensics) by Berla Corporation		Transportation
0830		Speaker/Welcome - Delphi	CANBUS II CanBusHack, Inc	Software Reverse Eng - TheIALabs	Vehicle "Practicum"	Breakfast
0900		Legal - Battelle Ethics - Venable				Team Presentations
1000		Lunch	Lunch	Lunch	Lunch	Review NDA/Legal
1030		CANBUS I CanBusHack, Inc	Transportation	Software Reverse Eng - TheIALabs		Lunch
1100			General Dynamics Land Systems Tour	Hardware Reverse Engineering / Hardware Hacking- Battelle	Vehicle "Practicum"	Closing
1130			Virtual Vehicle Activity	Socket CAN AutoImmune		Transportation
1200		Special Topic I		How to Conduct an Assessment- AIS		Special Topics
1230		Special Topic II	Keynote- David Strickland, Venable		Dinner	Threat Assessment Tabletop Exercise
1300	Set-up (Staff Only)	Special Topic III	Social/ Dinner	Dinner		Special Topics
1330		Special Topic IV		Transportation		Special Topics
1400		Dinner				Special Topics
1430		Attack Surfaces Analysis - UC-Berkley				
1500		Special Topic V	Transportation			
1530	Registration	Transportation			Vehicle "Practicum"	
1600		LEGEND				
1630		Food				
1630		CLOSED; Teams only				
1700		CLOSED; Teams only				
1730		Practicum				
1730		Transport				
1800		Lecture				
1830		CLOSED; Invitation Only			Hacker Snax	
1900		CLOSED; Invitation Only				
1930						
2000						
2030						
2100						
2130						
2200						
2230						
2300						
2330						
2400						
0100					Transportation begins	

# How much does it cost for a student to participate?

- *Free* for students
- Students are responsible for getting to Detroit Metro Airport (shuttle provided) or to Delphi in Troy, MI
- Meals, lodging, local transportation provided

Selection is merit based; pre-course work and ethical evaluation

Parents are welcome to accompany their student on Sunday, July 12 for registration and on Friday, July 17 closing lunch

# Special Challenge considerations

# Cybersecurity is an important and sensitive subject

- Data breaches in the news
- Impacts
  - Customer confidence
  - Brand image
  - Economic
- Opportunities
  - New technical domain
  - Increased job demand

***Cybersecurity identified as a needed new skill for auto industry***

***Gov. Snyder desires MI to be the “center of cybersecurity for auto and defense”***



# Cybersecurity is an important and sensitive subject

- Special confidentiality requirements for the Challenge
  - Preserve OEM support
  - Maintain automotive industry reputation
  - Commitment to a “community of interest”
- “What happens at Challenge, Stays at Challenge”
  - No postings to Facebook, Twitter, other social media
  - Do not talk about makes/models of vehicles
  - Do not identify automakers involved
  - Do not mention names of other students
  - Do not discuss specific technical discoveries

***All participants required to sign legal non-disclosure agreements, parents co-sign with minors***

# What can students share about Challenge Week?

- Developed foundational understanding of security approaches
- Learned about unique auto/cyber issues
- Teamed with working engineers and researchers in a professional environment....at Delphi Innovation Center in Troy, MI
- Developed relationships with professionals and other students....now they are a part of a “community of interest” – the auto cyber community!
- They participated in a unique event aimed at developing a new discipline for the automotive industry....they were selected and graduated from the Challenge!
- Students represented the type of great talent that reside in their schools and their State!

**Student qualifications?  
What are the deadlines?**

# Student qualifications

- High school juniors and seniors ( $\geq 16$  yrs. old)
- College
  - Highly self-motivated
  - Strong ethical behavior
  - Interest in science, technology and math

Looking for 30+ MI student applicants

Selection is merit based; pre-course work and ethical evaluation

Top students selected; typical down selection rate 50%

# Student recruitment & selection process timeline

***Nomination deadline extended to May 30***

**April 1 - 24**

**Student enrollment in on-line forum**

**Review of ethical foundations** (social media footprint)

**Now – April 24**

**Engage teachers & administrators**

-Ask for student nominations

Email  
[cyberautochallenge@sae.org](mailto:cyberautochallenge@sae.org)

**June 1 – June 12**

**Invite top students to Challenge**

Students sign NDAs (Parents co-sign for minors)

**April 24- May 30**

**Student completion of online preparatory courses**

Foundational understanding of CANBUS, cryptography, Linux or other computer sci materials, basic auto electronics, communication protocols, scripting

**Sunday, July 12 Arrival**

**July 13-17**  
SAE Battelle  
CyberAuto Challenge

# What is the benefit for a student if not selected?

- Learn fundamental real world concepts
  - Automotive electrical architecture, CAN BUS, scripting, etc. by completing the on-line course work
- Develop a deeper connection between their classroom courses and the application of the content they are studying
- Awareness that careers in the automotive industry are available and exciting...in a new emerging field
- Competitions are valuable experiences to have noted on applications for post-secondary schools and future jobs

# How to nominate a student

# How to nominate a student

Send an email to [cyberautochallenge@sae.org](mailto:cyberautochallenge@sae.org)

1. Attest to candidate's strong ethical character
2. Include student name and contact information (email address)
3. Indicate your relationship to nominated student (teacher, administrator, coach, etc.)
4. Include your school / institution's name and address
5. Include your name and contact information (email address and phone)

*Nominations accepted through April 24*

***Nomination deadline extended to May 30***



## Looking for your help...

- Nominate students
  - High school juniors and seniors ( $\geq 16$  yrs. old)
  - College
    - Highly self-motivated
    - Strong ethical behavior
    - Interest in science, technology and math

**Nominations accepted through ~~April 24~~  
cyberautochallenge@sae.org**

***Nomination deadline  
extended to May 30***

SAE INTERNATIONAL

# Forging the next generation auto cyber engineer

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