CyberTruck Challenge

Connecting next generation talent with the heavy-duty industry to keep vehicles secure.

www.cybertruckchallenge.org
Can Cyber Attacks Lead to Kinetic Results? and how can we tell?
Heavy Vehicle Cybersecurity

- Truck crashes are a big deal (80,000 lb at 75 mph).
- Trucks and Busses are critical infrastructure
  - Transport of high-risk/high-value cargo
  - Just-in-time inventory control
- Known and unknown attack vectors
Who will address the cybersecurity challenges for heavy vehicles? Or autonomous systems?
Mission & Purpose

• Help **develop the next generation workforce** by bringing awareness, excitement, professional involvement, and practicum-based training to the heavy vehicle cyber domain.

• Help **establish community of interest for heavy vehicle cyber** that transcends individual companies or departments and reaches across disciplines and organizations to make a more universal and experienced base of engineers and managers.
What we do at the CyberTruck Challenge

• We teach college students (> 50% graduate students) to hack modern commercial vehicles

• We form assessment teams including:
  • 6-8 students
  • 3-4 manufacturers
  • 2-3 suppliers
  • 2-3 academics
  • 1-2 hackers

• We provide excellent training from industry recognized cyber experts

• The teams conduct targeted and open-ended assessments on modern (2018 or newer) commercial vehicles

• We facilitate human networking and provide opportunities for mentor-protégé relationships
**CyberTruck Challenge 2019 Schedule**

<table>
<thead>
<tr>
<th>Sunday, 23 June</th>
<th>Monday, 24 June</th>
<th>Tuesday, 25 June</th>
<th>Wed., 26 June</th>
<th>Thursday, 27 June</th>
<th>Friday, 28 June</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td><strong>Group B</strong></td>
<td><strong>Group A</strong></td>
<td><strong>Group B</strong></td>
<td><strong>Group A</strong></td>
<td><strong>Group B</strong></td>
<td><strong>Time</strong></td>
</tr>
<tr>
<td>Before 0700</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Before 0700</td>
</tr>
<tr>
<td>0700-0800</td>
<td>Breakfast</td>
<td>Breakfast</td>
<td>Breakfast</td>
<td>Breakfast</td>
<td>Breakfast</td>
<td>0700-0800</td>
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<tr>
<td>0800-0900</td>
<td>CANBUS</td>
<td>CANBUS</td>
<td>CANBUS</td>
<td>CANBUS</td>
<td>CANBUS</td>
<td>0800-0900</td>
</tr>
<tr>
<td>0900-1000</td>
<td>Welcome and NDA</td>
<td>Welcome and NDA</td>
<td>Welcome and NDA</td>
<td>Welcome and NDA</td>
<td>Welcome and NDA</td>
<td>0900-1000</td>
</tr>
<tr>
<td>1000-1100</td>
<td>Crypto</td>
<td>Truck Systems</td>
<td>Wireless</td>
<td>CANBUS</td>
<td>Assessment</td>
<td>1000-1100</td>
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<tr>
<td>1100-1200</td>
<td>CANBUS</td>
<td>Lunch</td>
<td>Hardware RE</td>
<td>Assessment</td>
<td>Assessment</td>
<td>1100-1200</td>
</tr>
<tr>
<td>1200-1300</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>1200-1300</td>
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<tr>
<td>1300-1400</td>
<td>CANBUS (cont’d)</td>
<td>Truck Systems</td>
<td>Wireless</td>
<td>Assessment</td>
<td>Assessment</td>
<td>1300-1400</td>
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<tr>
<td>1400-1500</td>
<td>Truck Systems</td>
<td>Android</td>
<td>Software RE</td>
<td>Assessment</td>
<td>Assessment</td>
<td>1400-1500</td>
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<tr>
<td>1500-1600</td>
<td>Android</td>
<td>Software RE</td>
<td>Software RE</td>
<td>Assessment</td>
<td>Assessment</td>
<td>1500-1600</td>
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<tr>
<td>1600-1700</td>
<td>Software RE</td>
<td>Hardware RE</td>
<td>Hardware RE</td>
<td>Dinner</td>
<td>Dinner</td>
<td>1600-1700</td>
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<tr>
<td>1800-1900</td>
<td>Informal Welcome Reception (offsite)</td>
<td>Dinner</td>
<td>Dinner</td>
<td>Assesment</td>
<td>Free</td>
<td>1800-1900</td>
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<tr>
<td>1900-2000</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>1900-2000</td>
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<tr>
<td>After 2200</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>Site Closed</td>
<td>After 2200</td>
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**Legend**

- **Lecture / Demo**: All participants
- **Freightliner Side**: Interactive lecture and activities
- **Peterbilt Side**: Interactive lecture and activities
- **Meals**: Meals will be catered on-site
- **"Hacking"**: On vehicle assessments
- **Free**: Can hack, study, rest, leave, etc.
- **Site Closed**: No access the facility
- **Off Site**: Hosted tour of Greater Detroit

*Survey

**Topic**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Instructor, Affiliation</th>
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<tbody>
<tr>
<td>CANBUS</td>
<td>Robert Leale, CANBusHacks</td>
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<tr>
<td>Wireless</td>
<td>David Connett [Splunk]</td>
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<tr>
<td>Software Reverse Engineering</td>
<td>Aaron Cornelius [GRIMM]</td>
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<tr>
<td>Truck Systems</td>
<td>Jeremy Daily [The University of Tulsa]</td>
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<td>Hardware Reverse Engineering</td>
<td>Bill Hass [Cybersecurity Researcher]</td>
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<td>Android</td>
<td>Eduardo Novella [NowSecure]</td>
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<tr>
<td>Cryptography</td>
<td>Ben Gardiner [NMFTA]</td>
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<td>Tool Talk</td>
<td>John Cotner [NXP]</td>
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<tr>
<td>Army Vehicles and Cybersecurity</td>
<td>Jeff Jaczkowski [Army]</td>
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Capture the Flag events focused on heavy vehicles will be available until close of **Tuesday** evening led by Ben Gardiner [NMFTA].

CyberTruck Challenge
Plans for 2020 (and beyond)

- Hardware Reverse Engineering
- Software Reverse Engineering
- J1939 and CAN Bus Networking
- Android Reversing
- Wireless and Software Defined Radio
- Cryptography
- Truck Systems and Diagnostics
- Open and Creative Assessments
How do we measure success?

Industry sponsors have demonstrated product cybersecurity improvements
Students are hired into the industry
Participation growth
Student Participation & Growth

- Universities increasing by ~6/year
- Several developing vehicle cyber programs
- Others lack programs, but individual students show interest
- Few schools drop out after introduction
Class of 2017 (2 Trucks)
Class of 2018 (5 Trucks)
Class of 2019 (6 Trucks and a Trailer)
Class of 2019 (6 Trucks and a Trailer)
Class of 2019 (6 Trucks and a Trailer)
Outcomes – Student Intent & Connections

Likelihood to pursue a career in transportation cybersecurity (N=27)
- More Likely: 93%
- Less Likely: 0%
- No Change: 7%

Students who found a mentor (N=28)
- Yes: 96%
- No: 4%
Outcomes – Student Comments

“This experience is amazing. I would never get an opportunity to work with an actual vehicle if it wasn’t for the CyberTruck Challenge.”
-- Subhojeet Mukherjee, Ph.D. Candidate (CS)

"In one short week I came together with a range of professionals, students, and hobbyists. We spent two days getting a broad crash course in reverse engineering. Then with teams and a mentor, we chose a project or two from a range of levels that make up the various truck systems. It was intense; I was totally engaged; it was one of the most fantastic weeks of my life."
- Zach Aubin, Graduate Student in Computer Science, Class of 2022.

“The biggest benefit for me was probably talking with all the professionals in industry. Talking to them about what they did just affirmed that I want to work in the same field.”
-- John Maag, Electrical and Computer Engineering, Class of 2019
What Can the CyberTruck Challenge Facilitate for Assured Autonomy?

• Talent Generation
• Discovery of Vulnerabilities
  • Cyber Physical
  • Privacy (Forensics and IP)
• Build Trust in a Community
• Identify Systems Level Security Challenges
  • Human
  • Corporate
  • Machine
  • Network
• Models for engagement and tech. transfer for other verticals
• Ethics and Responsible Disclosure
• Testing and Evaluation
  • Can we provide hard real-world reference problems?
SAVE THE DATE

What: CyberTruck Challenge 2020
Where: Macomb Community College Sports & Expo Center
       Warren, MI
When: June 21-26, 2020
For more information:
       www.cybertruckchallenge.org
Sign up for the mailing list.
Thank you

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