Meet the Speaker

Karl Heimer

Karl Heimer

- Founder: CyberAuto Challenge
- Co-Founder: CyberTruck Challenge
- Sr. Technical Advisor for Cybersecurity to the Michigan Auto Office & Michigan Defense Center

Past Positions

- Battelle, Sr. Research Director for Cybersecurity
- Sparta, Division Manager
- Lockheed Martin, Sr. Program Manager
- US Army, OIC Army Technical Counter-Intelligence Cyber-forensics Laboratory (and other assignments)

Education

- Master's of Science, Computer Science

Automotive-ISAC – Information Sharing & Analyst Center (Auto-ISAC)

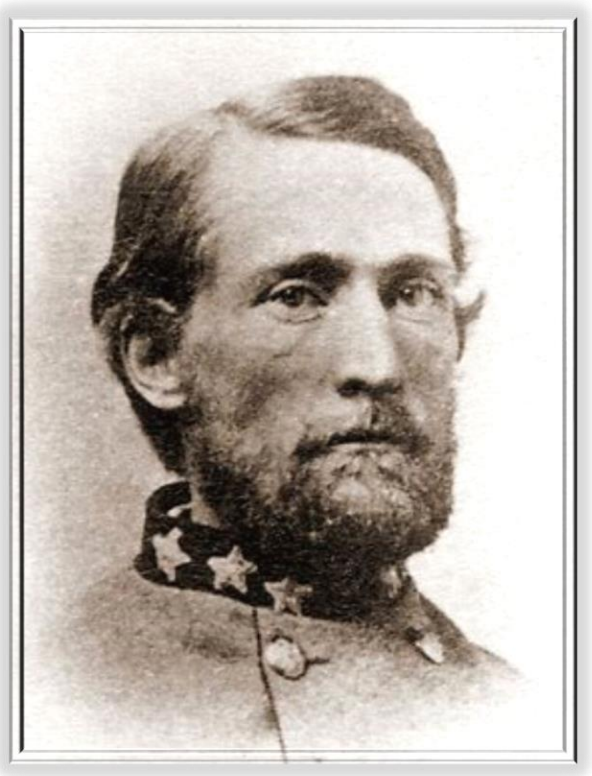
Education – The CyberAuto Challenge and CyberTruck Challenge

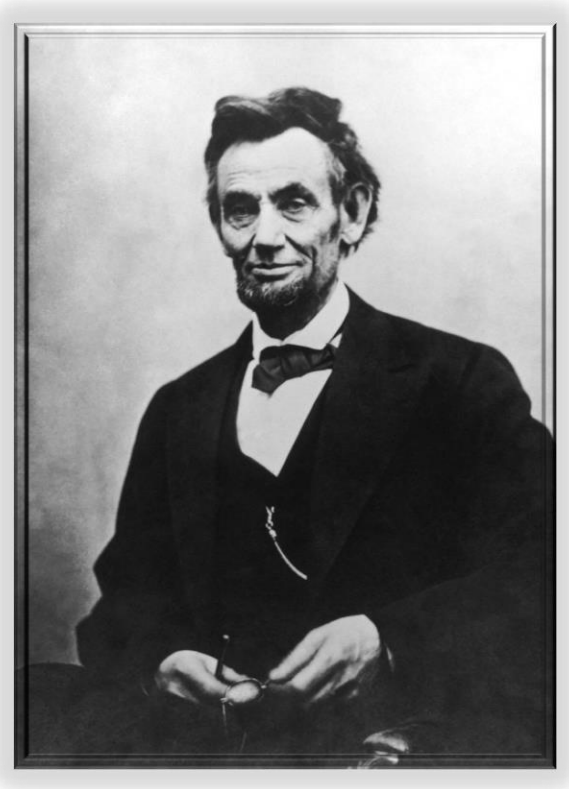
Karl Heimer, Sr. Consultant for Cybersecurity to Michigan Auto Office & Michigan Defense Center
Founder: CyberAuto Challenge; Co-Founder: CyberTruck Challenge

Auto-ISAC Summit, Plano, Texas
October 23-24, 2019

AUTO-ISAC
Automotive Information Sharing and Analysis Center

Training = Quality Assurance

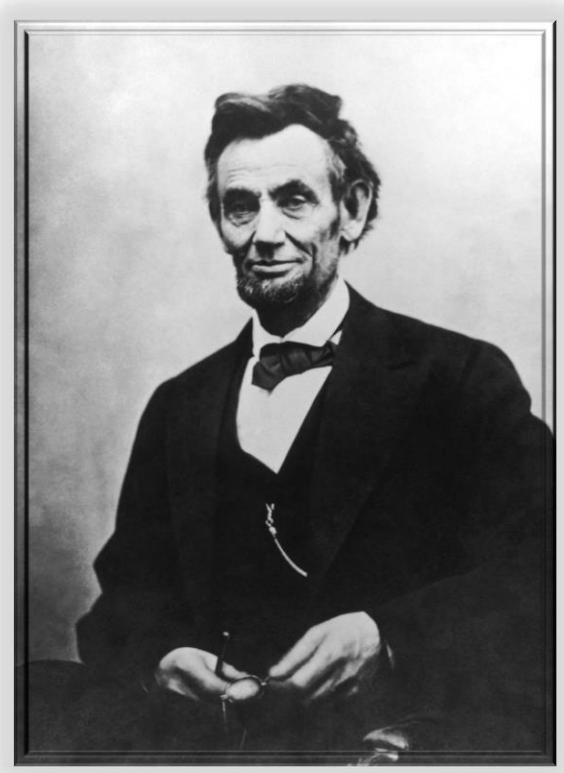




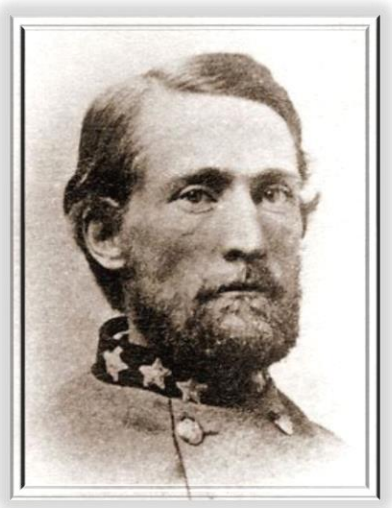
Training = Quality Assurance

I can make more generals, but horses cost

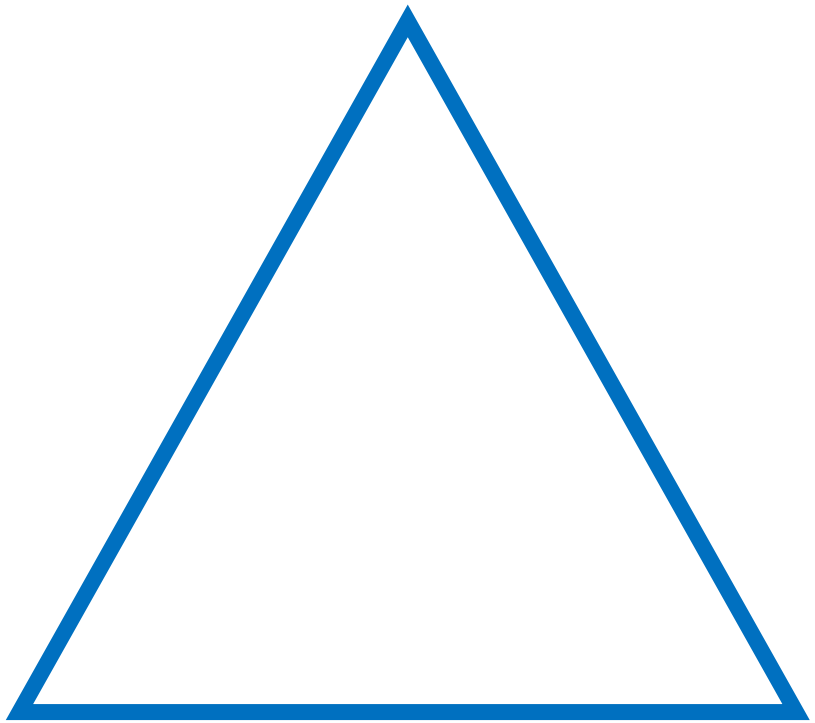
- Abraham Lincoln



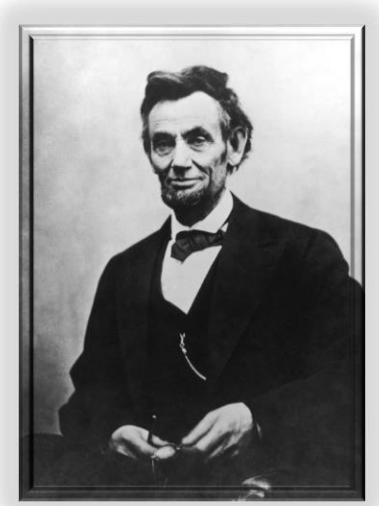
Training = Quality Assurance



Practicality



Currency **Fusion/Synthesis**



CyberTruck Challenge 2020

What is the CyberTruck Challenge?

- A practicum based training event
- Teaches the basics of “hacking” skills to university students
- Forms “learning groups” composed of students, industry experts, hackers, and government engineers
- Real trucks
- Real hackers
- A real challenge

Mission & Purpose

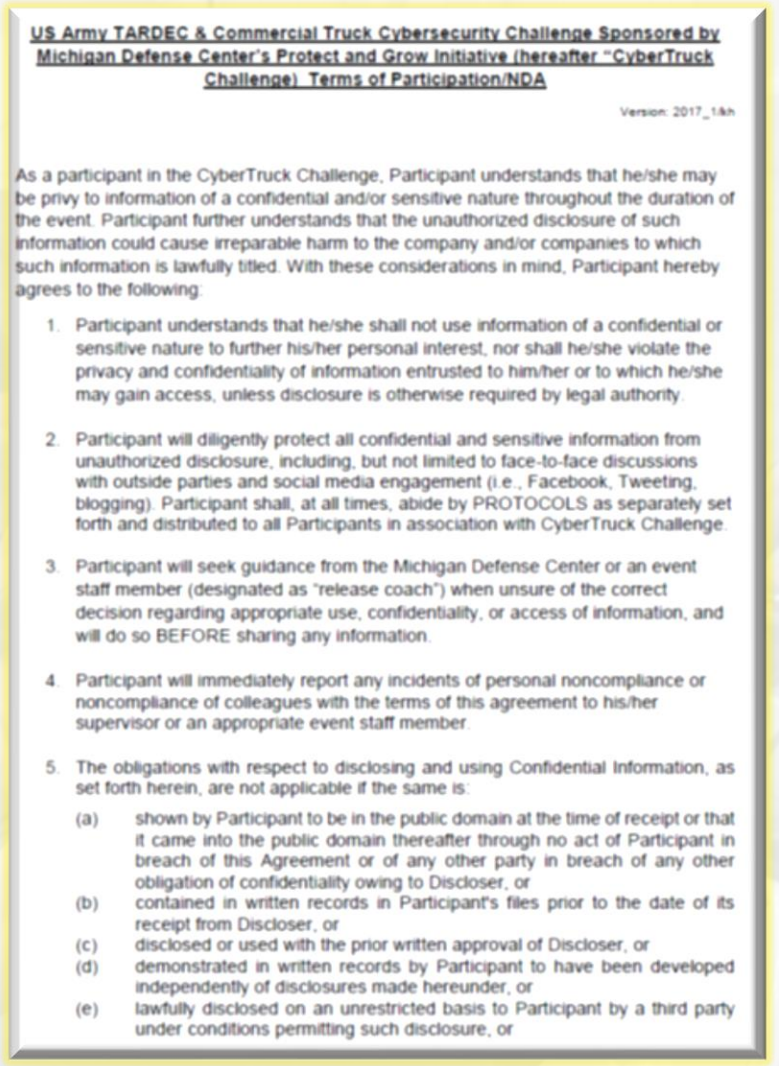
- Help **develop the next generation workforce** by bringing awareness, excitement, professional involvement, and practicum based training to the heavy vehicle cyber domain.
- Help **establish community of interest for heavy vehicle cyber** that transcends individual companies or departments and reaches 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 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 of a modern (2017 or newer) commercial vehicle

Protections and Confidentiality

- The CyberTruck Challenge is pro-Industry
- All participants sign a Non-disclosure agreement
  - Protect Brands
- Sponsors can withhold their logo.
- Industry sponsors can redact photos and content. In 2019 we will not allow media on premise
- All notes and work product are destroyed on the last day.
- Computers are reformatted.
- No social media during the event.
- No phone or photos (other than the designated event camera – high quality camera with tripod – you can take any pictures with this camera and we will post acceptable photos).



US Army TARDEC & Commercial Truck Cybersecurity Challenge Sponsored by Michigan Defense Center's Protect and Grow Initiative (hereafter "CyberTruck Challenge) Terms of Participation/NDA

Version: 2017_1Mh

As a participant in the CyberTruck Challenge, Participant understands that he/she may be privy to information of a confidential and/or sensitive nature throughout the duration of the event. Participant further understands that the unauthorized disclosure of such information could cause irreparable harm to the company and/or companies to which such information is lawfully titled. With these considerations in mind, Participant hereby agrees to the following:

1. Participant understands that he/she shall not use information of a confidential or sensitive nature to further his/her personal interest, nor shall he/she violate the privacy and confidentiality of information entrusted to him/her or to which he/she may gain access, unless disclosure is otherwise required by legal authority.

2. Participant will diligently protect all confidential and sensitive information from unauthorized disclosure, including, but not limited to face-to-face discussions with outside parties and social media engagement (i.e., Facebook, Tweeting, blogging). Participant shall, at all times, abide by PROTOCOLS as separately set forth and distributed to all Participants in association with CyberTruck Challenge.

3. Participant will seek guidance from the Michigan Defense Center or an event staff member (designated as "release coach") when unsure of the correct decision regarding appropriate use, confidentiality, or access of information, and will do so BEFORE sharing any information.

4. Participant will immediately report any incidents of personal noncompliance or noncompliance of colleagues with the terms of this agreement to his/her supervisor or an appropriate event staff member.

5. The obligations with respect to disclosing and using Confidential Information, as set forth herein, are not applicable if the same is:

   (a) shown by Participant to be in the public domain at the time of receipt or that it came into the public domain thereafter through no act of Participant in breach of this Agreement or of any other party in breach of any other obligation of confidentiality owing to Discloser, or

   (b) contained in written records in Participant's files prior to the date of its receipt from Discloser, or

   (c) disclosed or used with the prior written approval of Discloser, or

   (d) demonstrated in written records by Participant to have been developed independently of disclosures made hereunder, or

   (e) lawfully disclosed on an unrestricted basis to Participant by a third party under conditions permitting such disclosure, or

Schedule & Curriculum

Rev: Draft-20190417 B

CyberTruck Challenge 2019 Schedule

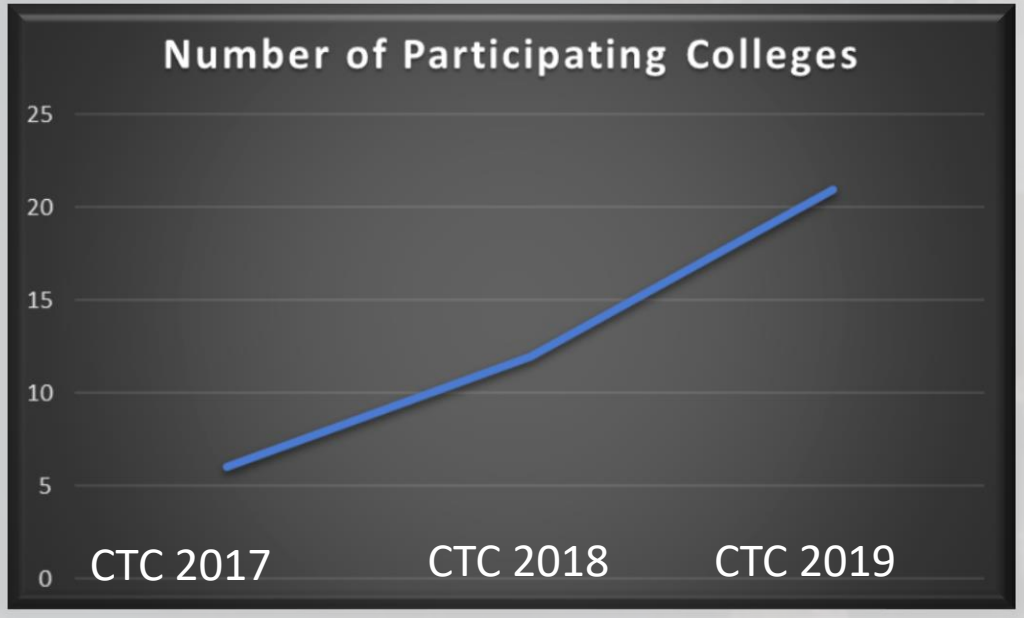
Time	Sunday, 23 June	Monday, 24 June		Tuesday, 25 June		Wednesday, 26 June	Thursday, 27 June	Friday, 28 June
		Group A	Group B	Group A	Group B			
Before 0700	Site Closed	Site Closed		Site Closed		Site Closed	Site Closed	Site Closed
0700-0800		Free		Free		Free	Free	Free
0800-0900		Breakfast/Registration		Breakfast		Breakfast	Breakfast	Breakfast
0900-1000		Welcome and NDA		Wireless	Android	Assessment	Assessment	Student Team Briefs
1000-1100		Truck Systems Intro	Wireless		Truck Systems			
1100-1200		CANBUS		Crypto				Review*
1200-1300		Lunch		Lunch		Lunch	Lunch	Lunch
1300-1400		CANBUS (cont'd)	Crypto	Hardware RE	Software RE	Assessment	Assessment	Hosted "Tour of Greater Detroit for Career and Fun"
1400-1500			Truck Systems Intro					
1500-1600		Android	CANBUS					
1600-1700		Truck Systems		Software RE	Hardware RE			
1700-1800								
1800-1900	Informal Welcome Reception (offsite)	Dinner				Dinner	Dinner	
1900-2000		Free		Dinner		Assessment	Free	
2000-2100		Site Closed		Tool Talk*				
2100-2200	Site Closed			Site Closed				
After 2200						Site Closed	Site Closed	

What's it like?

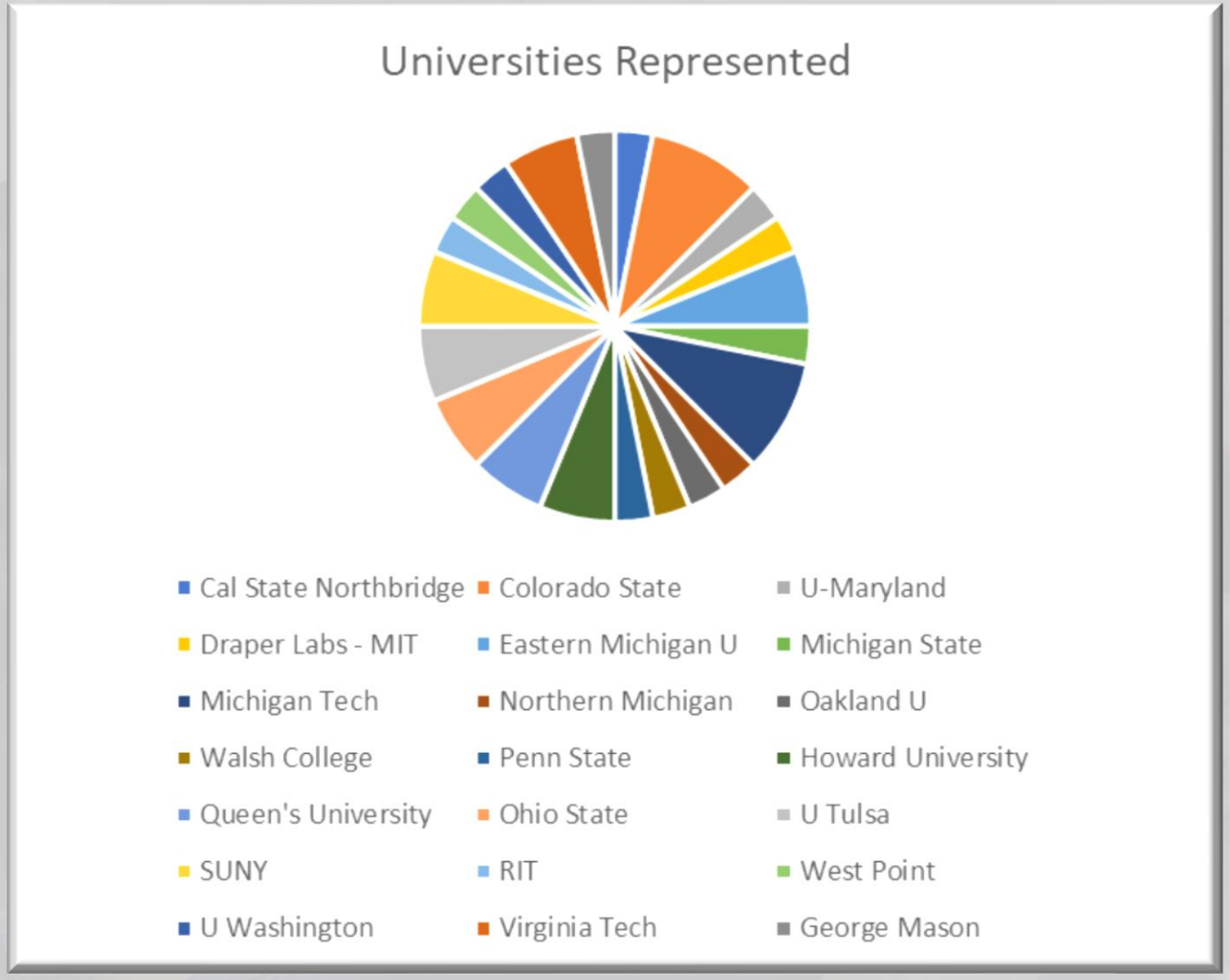
What's it like?

What's it like?

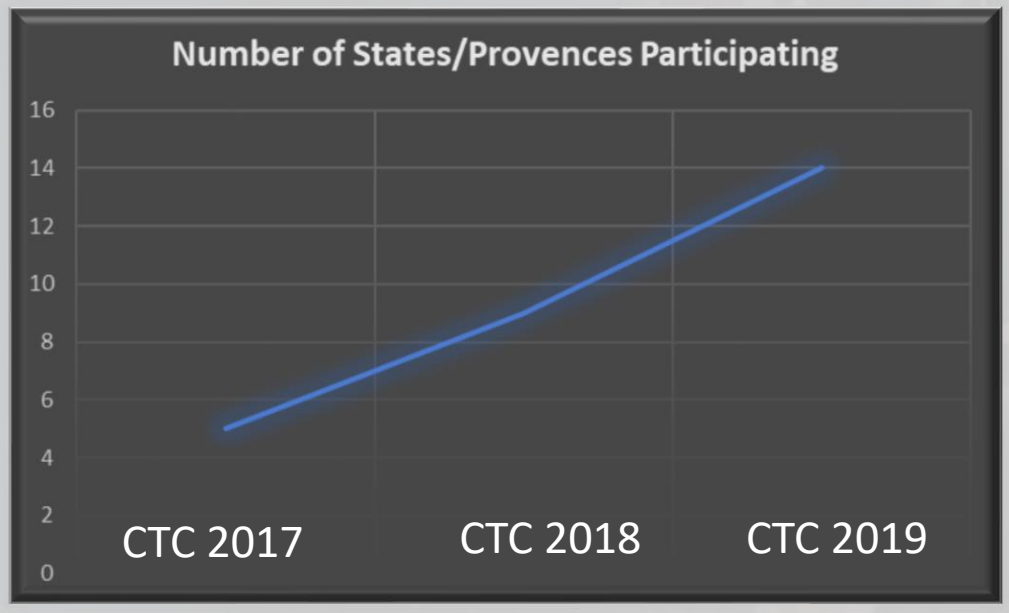
Student Participation & Growth



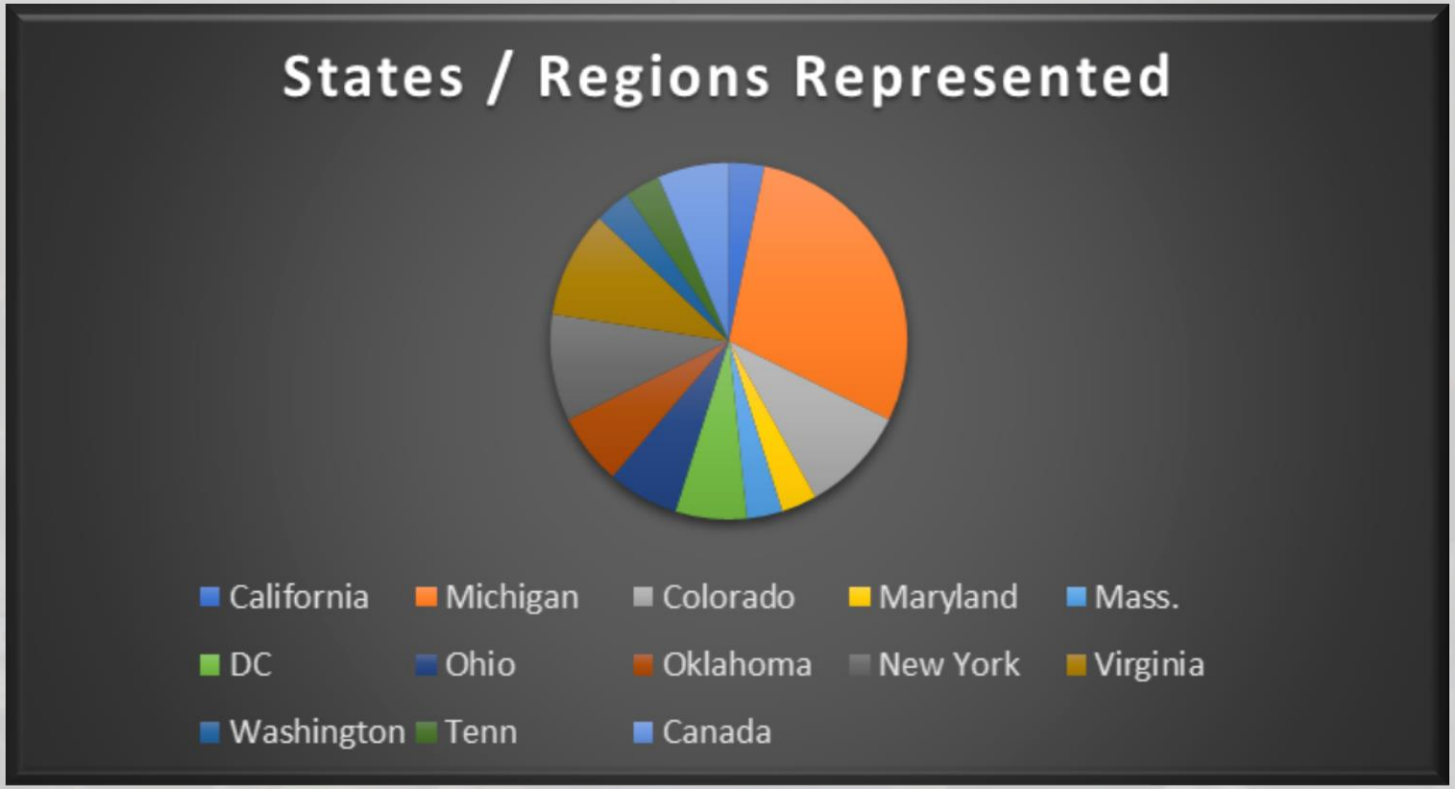
- Universities increasing by ~6/year
- Several developing vehicle cyber programs
- Others lack programs, but individual students show interest
- Few schools drop out after introduction



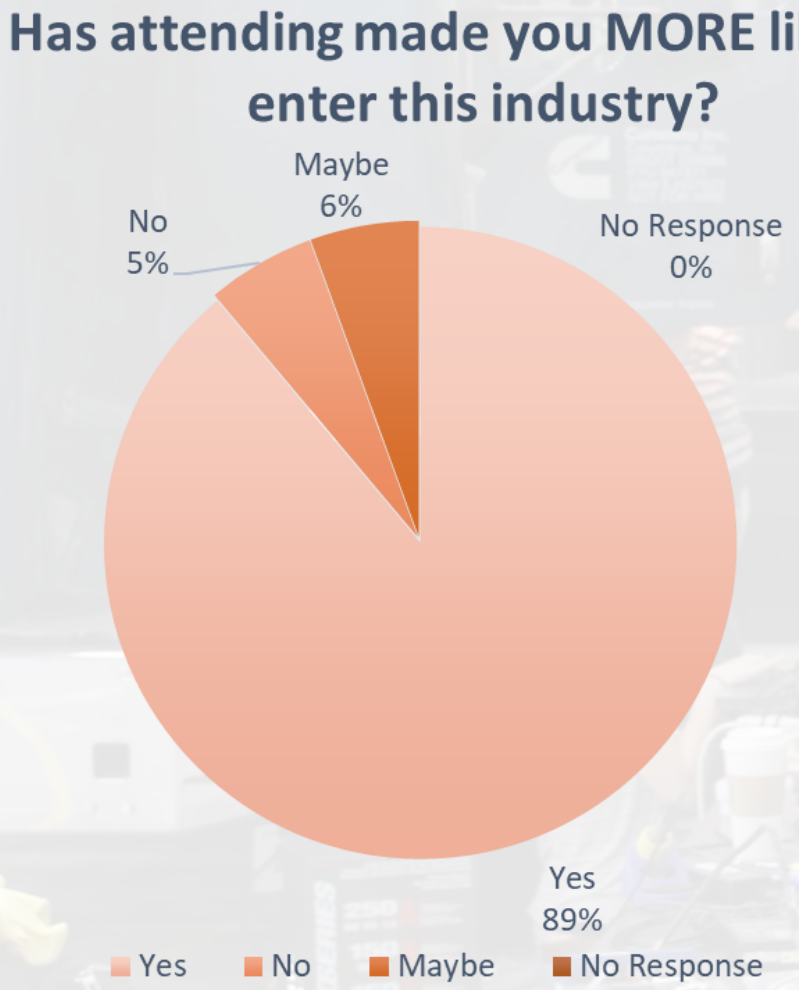
More States / Regions Represented



- Expanding regional representation
- Few Regions drop out after introduction
- Seek help finding more international participation



Outcomes – Student Intent & Connections



Outcomes – Student Comments

"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, Class of 2019 (EE)

"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.

"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)

Sponsors


OLD DOMINION
FREIGHT LINE


VOLVO
VOLVO GROUP


Bendix


NMFTA
National Motor Freight
Traffic Association, Inc.


GEOTAB
management by measurement


Cummins


THE UNIVERSITY of
TULSA


MICHIGAN
DEFENSE CENTER
MICHIGAN ECONOMIC
DEVELOPMENT CORPORATION


PACCAR


DAIMLER

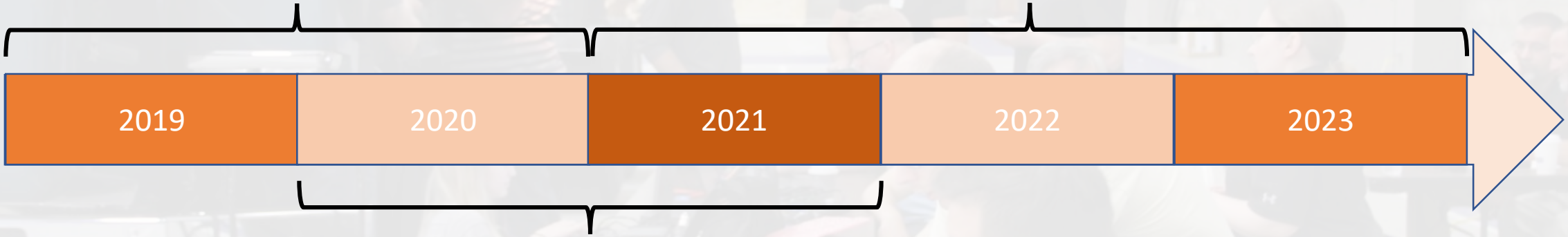

THE OHIO STATE UNIVERSITY
CENTER FOR AUTOMOTIVE RESEARCH


omnitracs

Plans over next 1-5 years

~~1.) Pre-work and selection~~
2.) College program tie-in
3.) CTF component
4.) NSF Workshops

1.) EV-EVSE attack vectors (electrical vehicle infrastructure
2.) “Smart City” attack vectors
3.) Crypto update pending advances in quantum cryptography



1.) Metrics Framework
2.) Tools and vuln checkers
3.) Security product targets

SAVE THE DATE – CTC2020

- CyberTruck Challenge 2020
- Macomb CC Sports & Expo Center
- June 21-26, 2020
- Optional “Detroit Day” during which participants can get some of the “Detroit Experience” – and MEDC outreach activity
- Question? Sponsorship? Mentorship?

Sign-up? Email or call

- jeremy.daily@colostate.edu
- karl.heimer@outlook.com

SAE CyberAuto Challenge 2020

What is the CyberAuto Challenge?

The Challenge is a week-long (5 day) practicum based workshop

- series of classroom lessons and discussions alternating with hands-on work using
  - real cars
  - real equipment
  - real communications protocols
- team with industry experts including automotive engineers, government engineers, and ethical “white hat” hackers.
- plan and perform analysis and provide input on current model full-feature cars

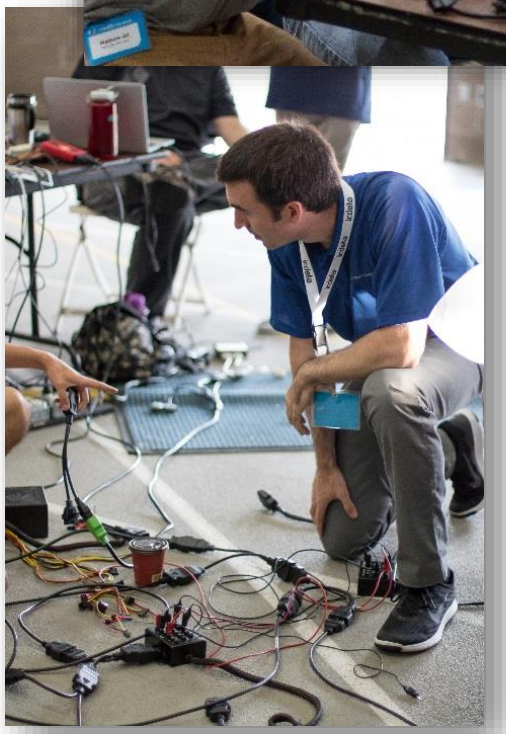
Forging the next generation auto cyber engineer

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 opportunity



Goal

Twin, co-equal goals:

- 1.) Develop a talent pipeline for government/industry by training and exciting the next generation workforce about careers in automotive cybersecurity

- 2.) Foster and support a community of interest regarding automotive cybersecurity to help facilitate both understanding and communication among industry, government, and the research community

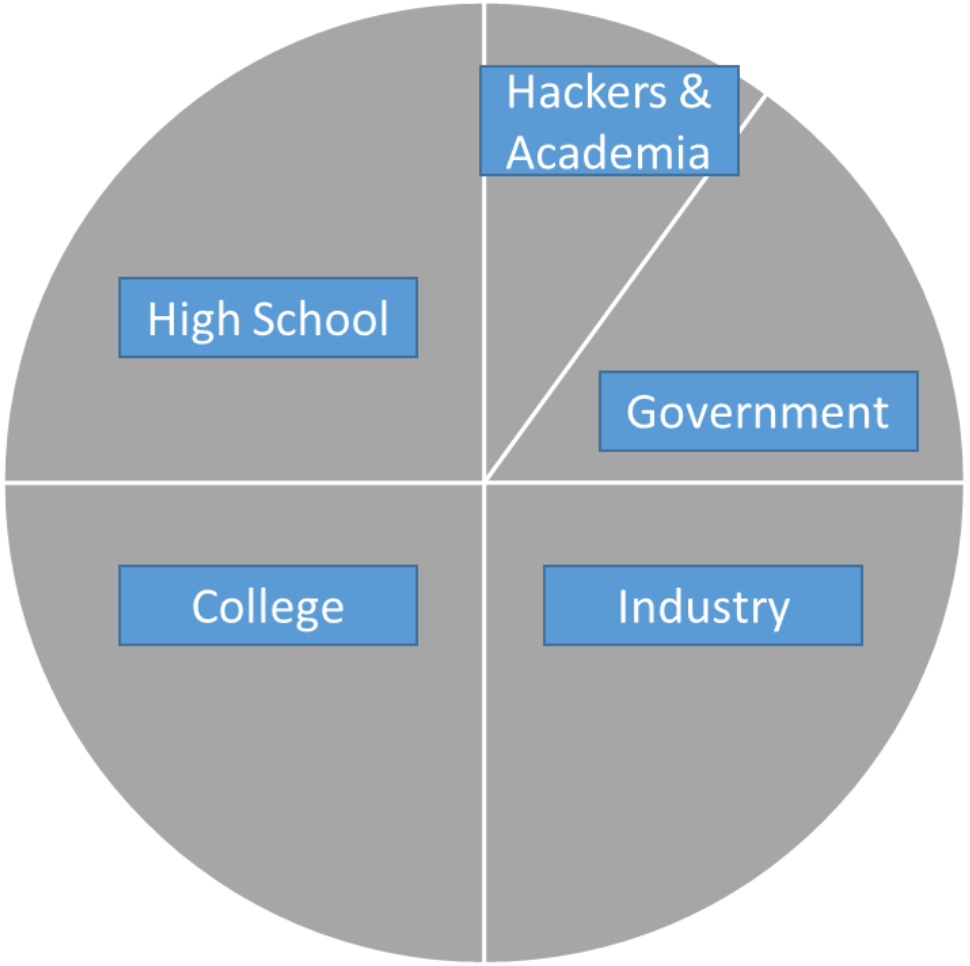
Benefits for students

- Develop foundational understanding of security approaches
- Learn about unique automotive cyber issues
- Increase technical skills; particularly in CAN protocols and programming
- Put theory to practical use
- Develop initial project management skills; experiencing time constraints and limited resources
- Team with working engineers and researchers in a professional environment
- Develop relationships with professionals and other students….now they are a part of a “community of interest” – the auto cyber community!
- Participate in a unique event aimed at developing a new discipline for the automotive industry

Benefits for professional team members

- Develop and deepen peer to peer relationships with automotive engineers (OEM and supplier), researchers and government representatives
- Raise awareness among students of the highly technical nature of automotive jobs; igniting interest in automotive careers
- Actively develop the future talent pipeline in cybersecurity, ensuring a well-trained and educated workforce for the automotive industry
- Develop mentor-protégé relationships with students
- Directly assess student capabilities for potential job recruitment
- Developed a germ of cyber auto “community of interest” for the future

The Cohort


Hackers & Academia
High School
Government
College
Industry

Challenge week schedule

Monday 22July2019			Tuesday 23July2019			Wednesday 24July2019			Thursday 25July2019			Friday 26July2019			24-hour
Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	
Breakfast			Breakfast			Breakfast			Breakfast			Sleep / Recover / Clear Residence			0700-0730
Welcome			CANBUS 2	Software RE	Wireless	EV - EVSE	Wireless	SocketCAN	ROE and Planning						0730-0800
Legal				Hardware RE					ASSESSMENT						0800-0830
Lab Orientation						Hardware RE		EV - EVSE							0830-0900
Team Intros / Integration			Networking / Break			Networking / Break									0900-0930
CANBUS 1	CANBUS 1	Hardware RE	CANBUS 2	Hardware RE	Wireless	Hardware RE	Wireless	EV - EVSE				Outbrief			0930-1000
							SocketCAN								1000-1030
Networking / Break			Networking / Break												1030-1100
CANBUS 1	CANBUS 1	Hardware RE	Software RE	Hardware RE	CANBUS 2			Software RE				Review of NDA			1100-1130
Lunch			Lunch			Lunch			Lunch			Graduation			1130-1200
															1200-1230
CANBUS 1	CANBUS 1	Hardware RE	Software RE	Hardware RE	CANBUS 2	Hardware RE	SocketCAN	Software RE				RELEASE			1230-1300
				CANBUS 2		Wireless									1300-1330
Networking / Break			Networking / Break				EV - EVSE								1330-1400
SocketCAN	Software RE	CANBUS 1	Software RE	CANBUS 2	CANBUS 2	Networking / Break									1400-1430
															1430-1500
Networking / Break			Networking / Break			Wireless	EV - EVSE	Software RE							1500-1530
															1530-1600
SocketCAN	Software RE	CANBUS 1	Software RE	CANBUS 2	SocketCAN	Ethics									1600-1630
			EV - EVSE	Wireless		Team Planning & ROE									1630-1700
															1700-1730
Dinner			Dinner			Dinner			Dinner						1730-1800
															1800-1830
Transport to Dorms			Transport to Dorms			Transport to Dorms									1830-1900
															1900-1930
									ASSESSMENT						1930-2000
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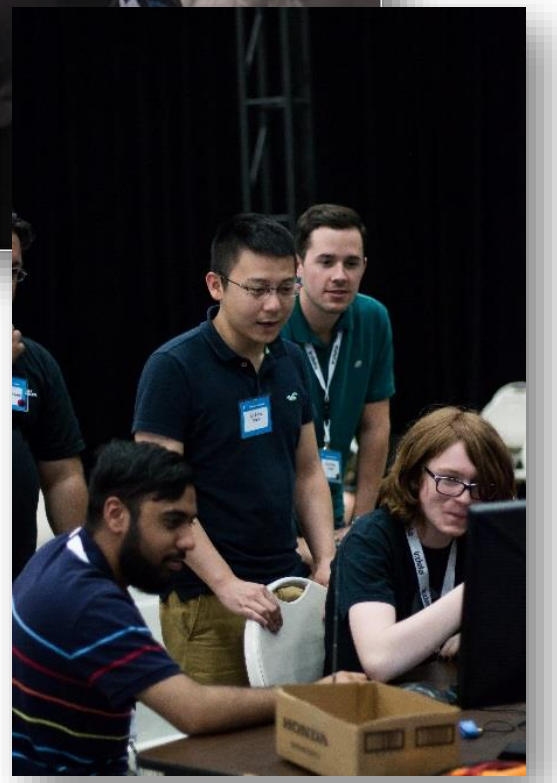
What are we Seeking

- Highly qualified and motivated students
  - High school juniors and seniors
  - College
- OEM vehicle teams
  - Vehicle to use as a “learning platform”
  - OEM engineers; 2-3 as team members
- Supplier participation
  - 1-2 vehicle team members
- Technical subject matter experts to provide training or lectures
- Funding support; various sponsorship levels available



SAVE THE DATE – CAC 2020

- CyberAugo Challenge 2020
- Macomb CC Sports & Expo Center
- July 12-16, 2020
- Question? Sponsorship? Mentorship? Sign-up? Email or call
  - marc.leduc@sae.org
  - karl.heimer@outlook.com

Future Vectors

- What new topics to consider?
- What do you need to see or hear for your organization to sponsor and/or participate?
- Is this a useful talent identification tool?
- Is this sufficiently technical to be a competency measurement?

Thank you

Audience Questions?

CONTACT INFO

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- Founder, CyberAuto Challenge
- Co-Founder, CyberTruck Challenge

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