Road to the Future

SANS Automotive Cybersecurity Summit – Detroit 2017

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Carmakers now integrate some of the most complex code on Earth.
Consequences: Vulnerabilities and Code Size

- ~750 VULNERABILITIES probable per shipped car
Partial Timeline of Automotive Cyberattacks

- **“Tuner” attacks “Prehistory”**
- **2010 USENIX Paper (UWash-UCSD)**
- **2011 USENIX Paper (UWash-UCSD)**
- **DARPA HACMS**
- **DARPA Fast Track Car-Hack Coverage**
- **Remote Compromise Of Unmodified Vehicle**
- **Insurance Dongle Remote Compromise & Control**
- **2010 USENIX Paper (UWash-UCSD)**
- **OBD port Plug-in attacks**
- **5 DEFCON Automotive Talks**
- **Remote Compromise & Control**
- **2014 DARPA HACMS**
- **Car Hack Coverage**
- **First DEFCON Car-Hacking Village**
- **2015 DARPA DARPA Fast Track Car-Hack Coverage**
- **DEFCON Truck Hacking Talks**
- **NOW**
- **LIDAR Attacks**

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Partial Timeline for the Defense

2010
- Internal OEM Research based on UWash - UCSD Research and USENIX

2011
- DOT-rita (Volpe) Starts studying Automotive Cybersecurity Issues

2012
- NHTSA issues Contract to study Automotive cyber Initial study of Protective products
- “I am the cavalry” Introduces 5-Star System for cyber
- Auto ISAC announced

2013
- DHS-DOT form Group to address Vehicular cyber Security issues

2014
- Auto ISAC To be operational
- State of Virginia Vehicular cyber Program and demo

2015
- TARDEC Platooning
- NHTSA Best-Practice Guidelines

NOW
- Cyber-based recall

And – the OEMs are standing up cybersecurity elements internally
Cities Ascendant
Collecting Facts

• Regulatory imperative to reduce traffic deaths
• Cities defining shared car society
• Humans are bad drivers
• Complexity is unbounded
• Economics: high ownership costs, low passenger costs
• Need for owners to properly maintain software and hardware
• Focusing of attacks
• Emerging controls and governance
Evolution of Purpose
# Review 2015’s “10 in 10” Predictions (subset)

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Status</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>All Cars will be CAV</td>
<td>100%</td>
<td>75% by 2020 // Ford SmartLink (etc.) for pre 2016 cars</td>
</tr>
<tr>
<td>Mandatory FOTA/SFOTA</td>
<td>100%</td>
<td>Efficacy studies // Update velocity // Fed UPTAIN (etc.)</td>
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<tr>
<td>Resilient Designs / Architectures</td>
<td>85%</td>
<td>DARPA HACMS initial example 2017</td>
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<tr>
<td>“Blessed” / Approved Architectures</td>
<td>85%</td>
<td>Foundational – best practice guidelines, etc.</td>
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<tr>
<td>Military =&gt; Commercial Tech Transfer</td>
<td>70%</td>
<td>DARPA HACMS // Collaborative ECU designs // Sensor Fusion</td>
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<td>Roadway Governance</td>
<td>60%</td>
<td>Europe considering some “features”</td>
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## Michigan’s Role

### Laws
- Driverless cars are permitted on all public roads.
- OEM supplied/controlled self driving “taxis” are permitted.
- Automated platoons of trucks are permitted.
- The public can buy and sell autonomous vehicles.
- Create a Michigan Council on Future Mobility to recommend policies and regulate vehicle networks.
- The [used] automated driving system will be considered the driver and operator for purposes of Michigan motor vehicle laws.
- Manufacturers and repairers can be protected from liability.

### Leadership
- Win competitions/evaluations for CAV
- Create most forward CAV laws in the nation
- Champion cybersecurity in the vehicle domain
- Construct most extensive ITS system in the world
- Build most advanced vehicular test capabilities (including cyber)
- Inspire forward thinking – and implement it
- Develop, attract, and retain top cyber talent
Opportunities
Discussion