From Driver Distraction to Driver Augmentation: Open Source in Cars

Alison Chaiken, she-devel.com

As Congress Mulls Mandate on Car Black Boxes, Data Ownership Remains Unclear
By Doug Newcomb  May 16, 2012 | 6:15 am | Categories: Miscellaneous
Our transportation system is

- Dangerous
- Time-wasting
- Polluting
- Loud!!!

because *until now* individuals had little power to change it.

Now: driver distraction

Goal: driver augmentation

Goal: driver empowerment
Same old problems, new platform

- Security
- Privacy
- Personal empowerment

Who will make the cool solutions?

Us!
Do we need “in-vehicle infotainment”?

BigCo's “infotainment”

What Drivers Need

Camera (RGB/IR)

Lane departure warning

Courtesy Tata Consultancy Services
“Patch Tuesday” hits Cars?

June 23, 2011, 1:01 PM


By CHERYL JENSEN

The MyFord Touch interface as seen on the 2011 Ford Edge.

New York Times, June 23 2011
# Status of Automotive Software

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Confirmed Operating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiat-Chrysler Blue&amp;Me (500, Delta), Kia Uvo, BYD</td>
<td>Microsoft Windows Embedded Automotive</td>
</tr>
<tr>
<td>Ford (all?)</td>
<td>MyTouch/Sync-Microsoft; OpenXC-Android</td>
</tr>
<tr>
<td>General Motors/Cadillac User Experience</td>
<td>MontaVista's GNU/Linux</td>
</tr>
<tr>
<td>Geely (China); Hawtai (China)</td>
<td>GNU/Linux: Moblin (MeeGo predecessor)</td>
</tr>
<tr>
<td>Renault R-Link</td>
<td>Android</td>
</tr>
<tr>
<td>Honda (Accord, Odyssey, Pilot), Audi, BMW (7-series and M models), Chrysler, Daewoo, GM (OnStar), Hyundai, Land Rover, Porsche, Saab (9-3) Renault (SM7)</td>
<td>QNX</td>
</tr>
</tbody>
</table>

Linux Foundation members: Toyota, Pelagicore, Symbio, Tieto
Automotive Linux Summit 2011 presenters: Toyota, Nissan, BMW
MeeGo Conference 2011 presenter: Nissan
Volkswagen has a pilot using Maemo (GNU/Linux).
Is this a “non-traditional” use of FOSS?

Open Source Information
This vehicle contains open source software, including without limitation, software distributed and/or modified under the GNU General Public License, Version 2, June 1991, and the GNU Lesser General Public License, Version 2.1, February 1999.

See www.oss.gm.com for additional information and to download related materials, including without limitation, the previous referred to licenses and software.

Open Source Downloads

2011 Chevrolet Volt

Click to see:

GM

Open Source Downloads

Welcome to the Open Source Downloads Website!

Select vehicle make, model and year

<table>
<thead>
<tr>
<th>Make</th>
<th>Model</th>
<th>Year</th>
<th>Download</th>
</tr>
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<tbody>
<tr>
<td>Chevrolet</td>
<td>Volt</td>
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<tr>
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</tbody>
</table>

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Current Automotive Security Situation is Shaky

Source: http://www.autosec.org/

Wheels
The Nuts and Bolts of Whatever Moves You

June 16, 2011, 12:49 PM

Nissan Leaf Telematics May Leak Driver Data to Third Parties

By JOHN R. QUAIN

Source: NY Times

Source: http://www.autosec.org/
Wireless access to car allows penetration of its data network.
MA “Right to Repair” Initiative 2012
Who cares about vehicular data?

- **Car health report business**: securely record mileage and “trouble codes” over entire history of a car, make available to used-car buyer

- **Personal environmental report card**: integrate subscriber's automotive pollution data with their smart-meter data, credit card data, etc. to assess overall impact

- **Data-based vehicle routing**: suggest route measured to be minimum-polluting or fastest at this time of day

- **Reality-based performance estimator**: what range do other drivers see for this model E.V. on my route to Tahoe?
How to access a car's data

OBDII connector found in every U.S. car since 1996.

Determine protocols in use by examining populated pins.

2006 Mazda 3
How to access a car's data: the scantool

Entry level: USB, limited protocol set, read-only comms, $40

Experienced user: Bluetooth, expanded protocols, some risk, $250

Scantool.net has great documentation and community support.
Ford and BugLabs' Android Dongle

32-bit ChipKit platform is Arduino-compatible at pin and API levels.
BayLeafs' State-of-Charge Display, Adopted by Nissan

http://tinyurl.com/7wngdsj, http://tinyurl.com/7ttz24h
OpenICE cooperating projects

nOBDy

Simple installation: packaged for popular Linux distributions.
How can I get involved?

- Ask an auto dealer, “What operating system does this car run?”
- Support the Right to Repair movement.
- Join one of many employers: engineer shortage!
- Put cool open-source hardware or software in your car right now.
- Roll your own HW or SW solution.
- Join Silicon Valley Automotive Open Source or come by our booth #7658.
Summary

- Smartphone and Internet privacy and security battles have come to cars.
- We could lose our existing right to repair our own cars.
- Or, cool stuff could be coming from developers and small businesses.
- There are opportunities RIGHT NOW.
- Come by Booth #? to learn more.
Silicon Valley Automotive Open Source Group

Free monthly meetings sponsored by ICS and Intel

Booth #7658
What does it mean to “own” data?

The creator of the device that generates data that I own must provide, as a bare minimum:

“any methods, procedures, authorization keys, or other information required” to read the data

and

“information provided [...] must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.”
Privacy Guarantees in Car Environment

- JM1BK3437512345678
  Vehicle Identifier Section: a particular car

- Proposal: encrypt the Vehicle Identifier Section of the VIN so that it cannot be remotely transmitted.

- Require “apps” to request access to VIS.
Vehicle data example: Ford's Fuel Efficiency Challenge

As part of its OpenXC announcement, Ford and Bug Labs showed off the Fuel Efficiency Challenge, which allows drivers of Ford Sync-enabled cars to share their fuel efficiency with others. (Credit: Daniel Terdiman/CNET)

Owner-empowering vehicle-data-mining ideas:
http://tinyurl.com/7oegrj7
Federal Motor Vehicle Owners Right to Repair Act

... requires vehicle manufacturers to provide the same service information to independent shops that they offer to their franchised dealers. ... auto manufacturers protect their proprietary vehicle repair information, requiring consumers to bring their cars to the dealer for expensive repairs. ... allows independent mechanics to compete fairly with dealerships ...

Source: Congresswoman Anna Eshoo
How to fix automotive security

- Automotive network protocols genuinely *do* need to be hardened.

- Virtualization-based security, packet filtering, firewalls, cryptographic signing and Android “paranoid network” already exist.

- Any approach that posits the necessity to invent new technologies is *wrong*.

- If NHTSA promulgates new rules, EFF, FSF, SFLC should participate!
Published UWa/UCSD automotive exploit

http://www.autosec.org/

- Use Software-Defined Radio to break in via wireless tire pressure sensors (or FM radio, or keyless entry ...).

- http://www.ted.com/talks/avi_rubin_all_your_devices_can_be_hacked.html

- Discover all of 8-byte codes by “fuzzing” attack or simply sniff bus traffic.

- Brakes locked and driver controls disabled via use of codes or simple DOS attack.

- But let's not make instrumenting our own vehicles illegal, too!
Ongoing mobile data privacy battle

“For crashes that don't involve litigation, especially when police or insurers are interested in assessing fault, insurers may be able to access the EDRs in their policyholders' vehicles based on provisions in the insurance contract requiring policyholders to cooperate with the insurer. However, some states prohibit insurance contracts from requiring policyholders to consent to access.”

Free culture movement needs to get involved in automotive

Current

Insecurity

Right to repair

Firewalling, key exchange

Existing likely trend

Security through obscurity
“Each manufacturer of a motor vehicle equipped with an EDR shall ensure by licensing agreement or other means that a tool(s) is commercially available that is capable of accessing and retrieving the data stored in the EDR that are required by this part. The tool(s) shall be commercially available not later than 90 days after the first sale of the motor vehicle for purposes other than resale.”

source: NHTSA website