

Automotive: new frontier for mobile Linux



ICS demos:
booths 48
and 67

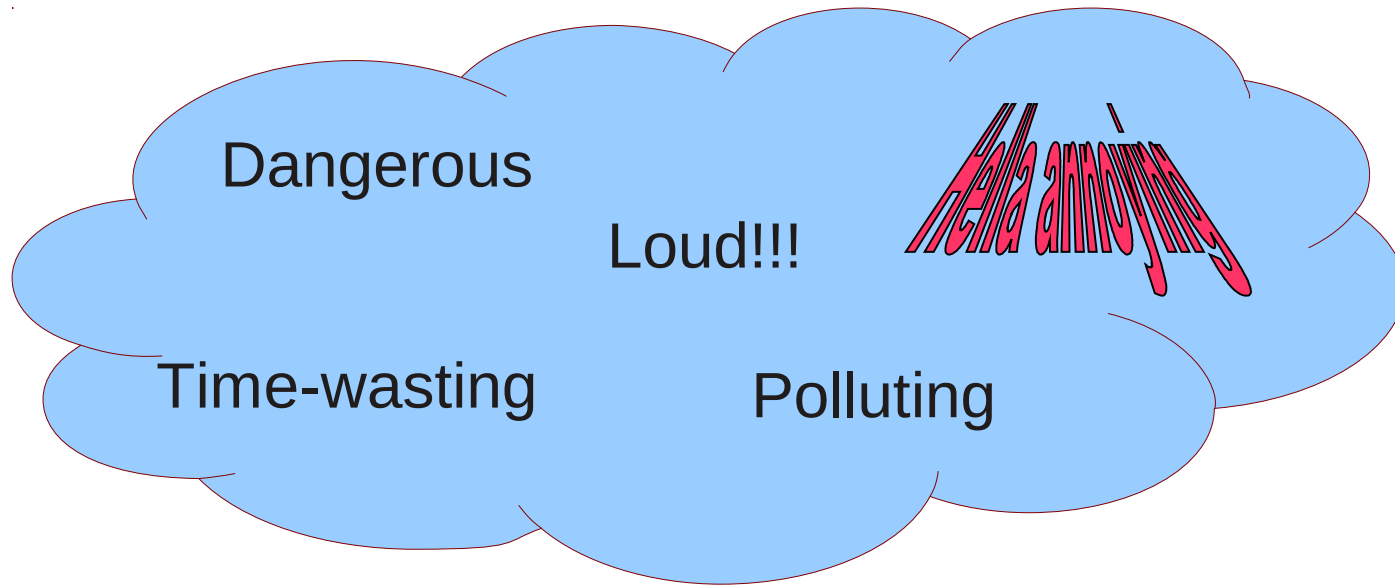
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<http://she-devel.com/>



Contents

- Why automotive Linux matters
- What's different and what's hard
- Automotive open-source project survey
- Opportunities for developers and the community

Our transportation system is

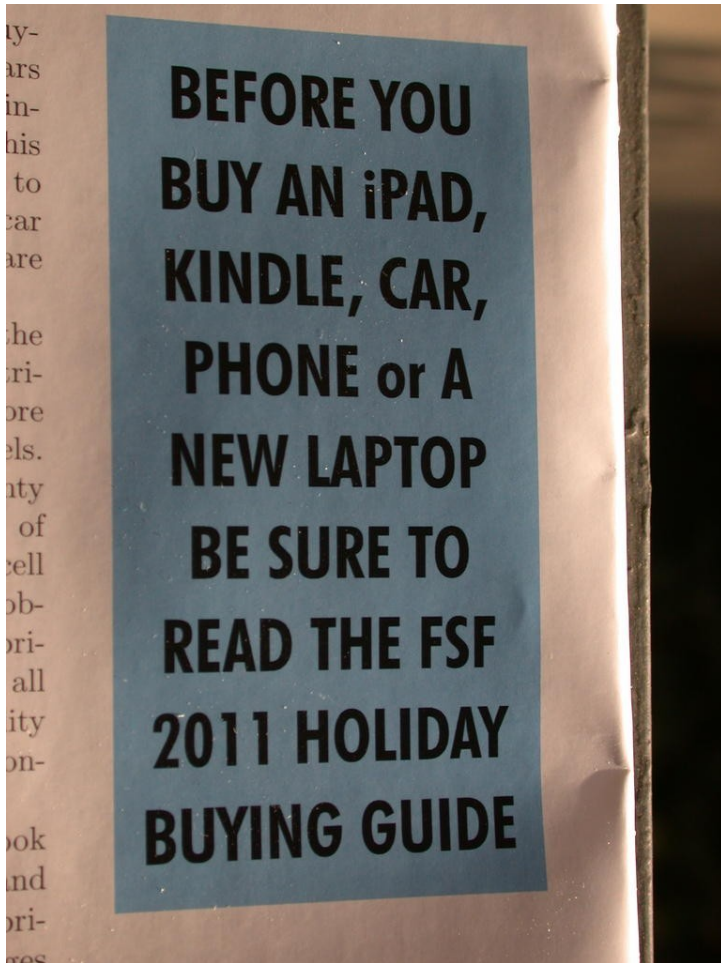


because

individuals had little power to change it ...

until NOW.

Exactly one political slide



June 23, 2011, 1:01 PM

‘Aggravating’ MyFord Touch Sends Ford Plummeting in J.D. Power Quality Survey

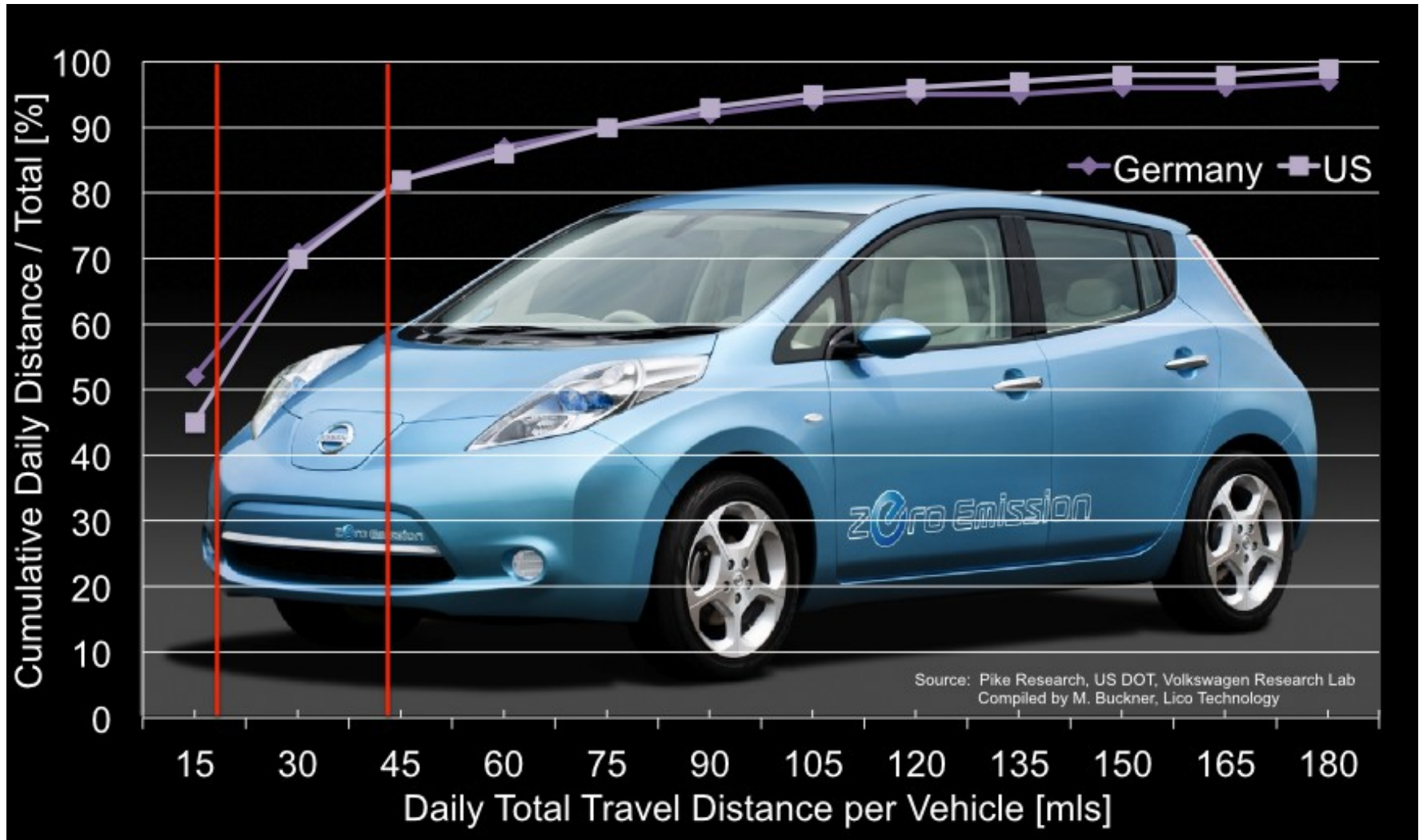
By CHERYL JENSEN



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

New York Times, June 23 2011

“Range anxiety”: a user perception problem



Let's help drivers better understand their needs.

Status of Automotive Linux

Manufacturer	Confirmed Operating system
Fiat-Chrysler Blue&Me (500, Delta), Kia Uvo	Microsoft Windows Embedded Automotive
Ford (all?)	MyTouch/Sync-Microsoft; OpenXC-Android
General Motors/Cadillac User Experience	MontaVista Linux
Geely (China); Hawtai (China)	Linux: Moblin (MeeGo-Tizen precursor)
Renault R-Link	Android
Honda (Accord, Odyssey, Pilot), Audi (A8L, Q5, A6), BMW (7-series and M models), Chrysler, Daewoo, GM (OnStar), Hyundai, Land Rover, Porsche, Saab (9-3) Renault (SM7)	QNX

Linux Foundation members: Toyota, Pelagicore, Symbio, Tieto

Automotive Linux Summit 2011 presenters: Toyota, Nissan, BMW

MeeGo Conference 2011 presenter: Nissan

The GENIVI Alliance Membership (www.genivi.org)

OEMs



First Tiers



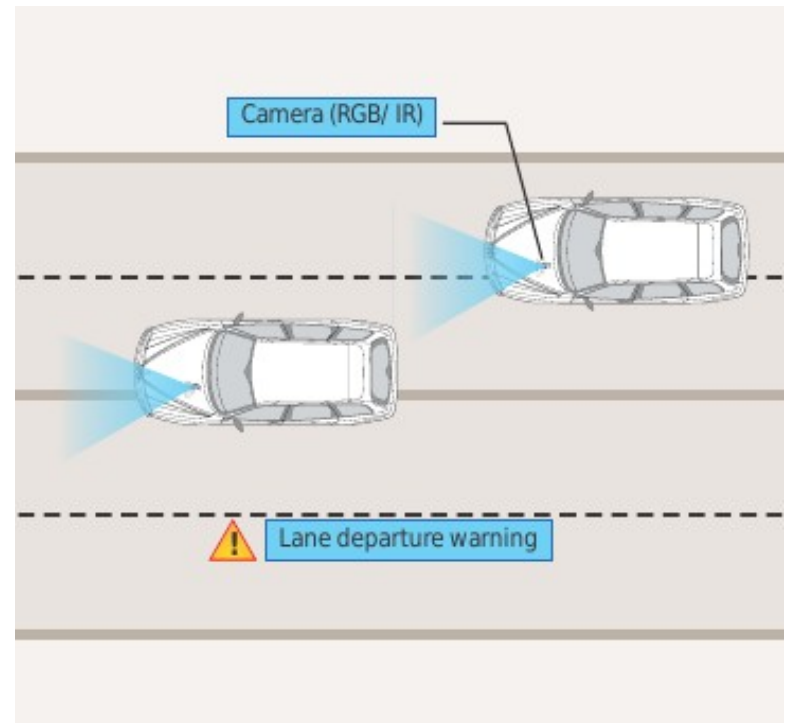
OSV, Middleware, Hardware, and Services Suppliers



Silicon



What is “in-vehicle infotainment”?



Courtesy Tata Consultancy Services

What “infotainment” calls to mind

What IVI could be

“Infotainment” 1st due to desire to monetize media sales

“91% of respondents said they would love to see a lane-change, blind-spot warning system ...

83% said they would like in-vehicle technologies that would automatically call a tow truck ...

Nearly $\frac{3}{4}$ said they'd like technology that would stop their car if the driver suffers a heart attack ...

That's about as far from Angry Birds as you can get.”

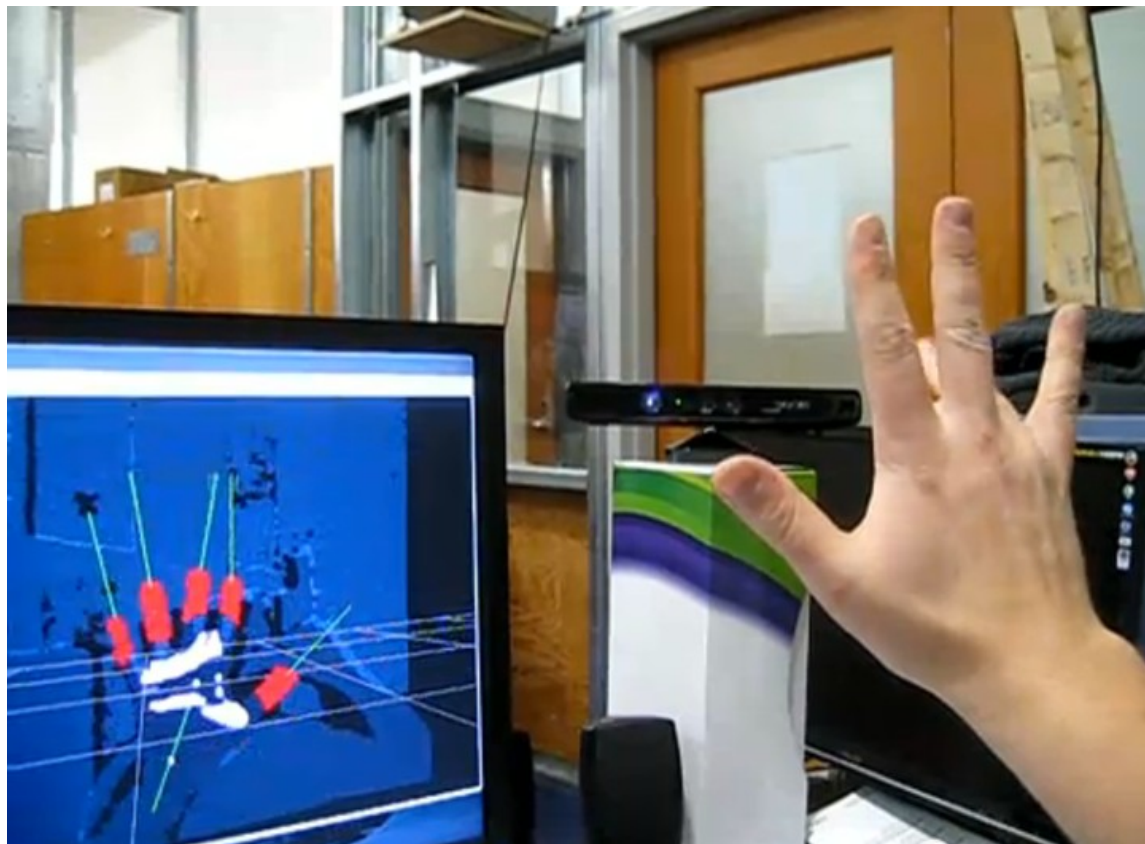
– Accenture survey data courtesy of [GigaOm](#)

Challenges for IVI

- Little-understood UI/UX
- Security: leave car in auto shop overnight
- Novel sensors, data buses and architectures
- Safety: not “kill -9” but kill dead!

Car is laboratory for new controls and displays

New UIs will debut in cars and migrate to other form factors.



“Kinect piano”

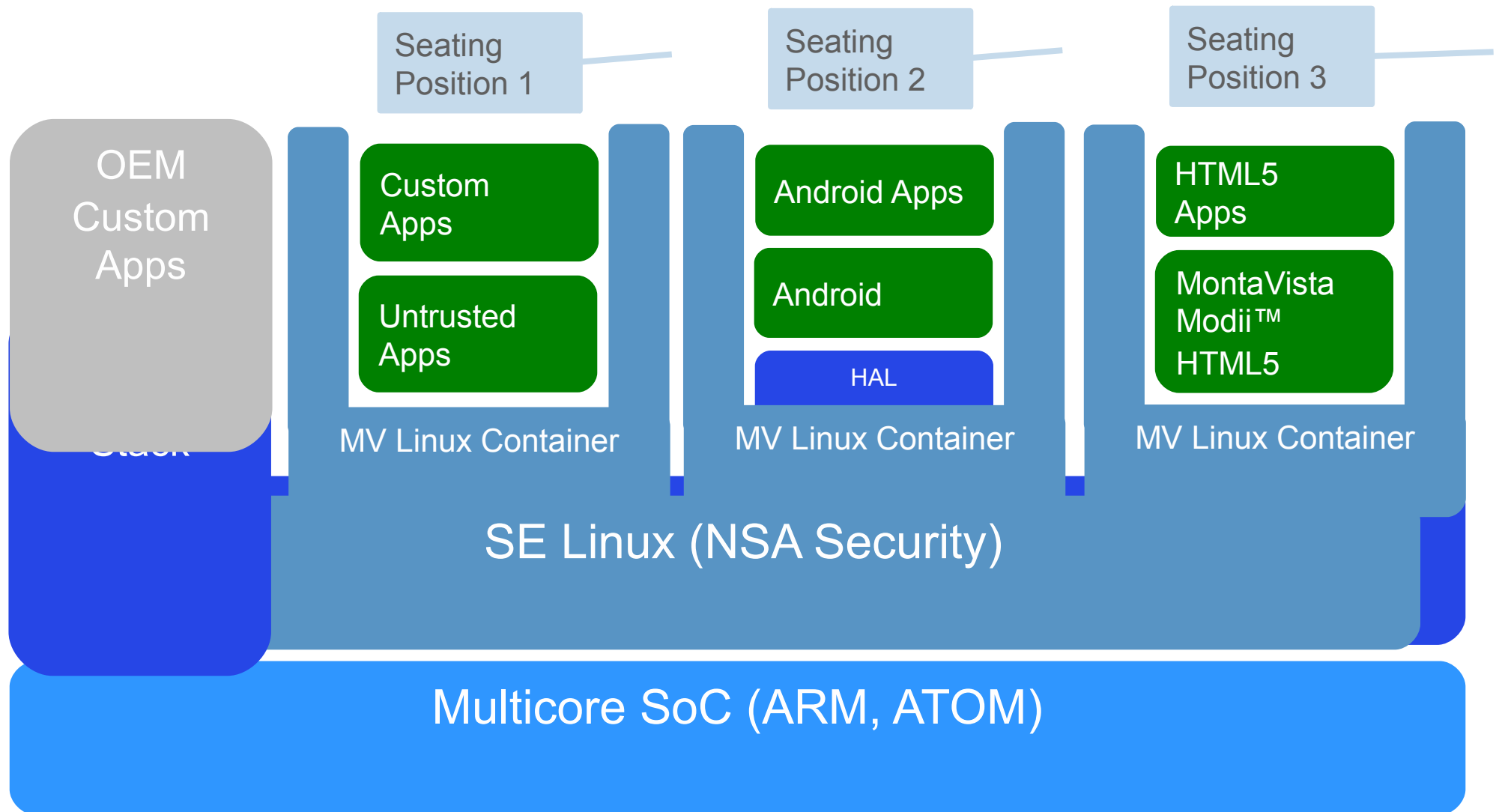
Do we need a motion-sickness.css for passengers?

Cadillac User Experience: Linux by MontaVista



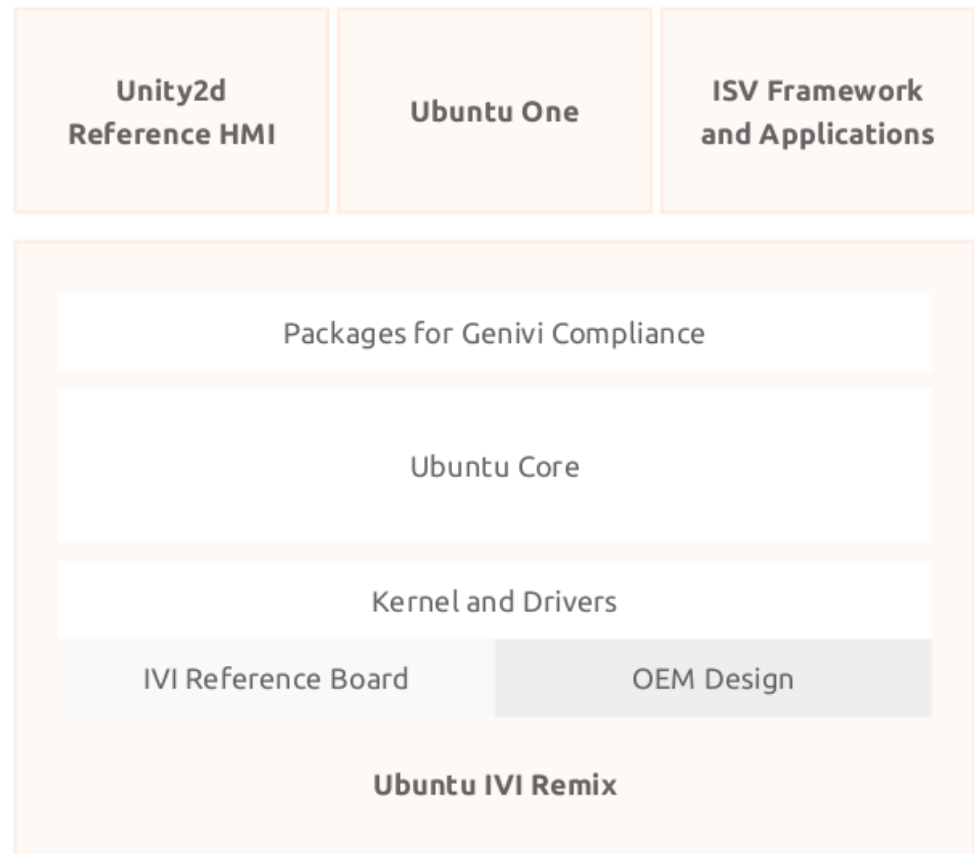
Status: limited developer pre-release, widely available Spring 2012

MontaVista's approach to security challenge



Excellent ELCE video by MontaVista: <http://tinyurl.com/7emextu>

Ubuntu-IVI Remix



Generating a lot of vendor interest.

Renault's R-Link is first native Android

Renault debuts R-Link, an in-dash Android system with app market

By Zachary Lutz  posted Dec 9th 2011 2:38PM

“application developers will progressively upgrade its content and offer more apps. They will be downloadable directly to the tablet inside the car or via 'My Renault' account thanks to the R-Link Store”



<http://www.renault.com/en/innovation/plaisir-et-confort/pages/r-link.aspx>

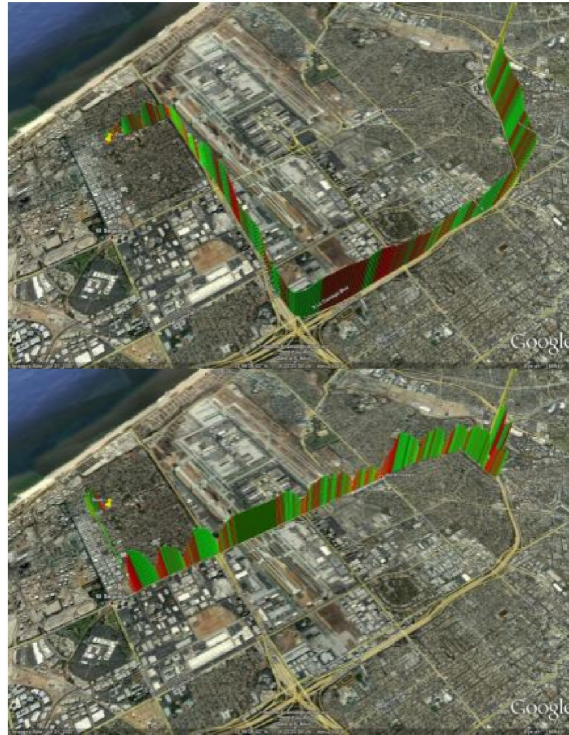
OBDGPSLogger Real-time Vehicle Diagnostics Capture Plot

There and Back Again: Lunch in El Segundo

Just going down to El Segundo for lunch, taking slightly different paths each way. By the airport, there's a large apparently blank bit; that's where I was in a tunnel and my GPS couldn't get a lock.

This trip was driving my Mini Cooper S.

Google Earth Screenshots



Developer Chunky_Ks
(Gary Briggs)
will demo in Booth 48

Tripzero: How do I test this in my car?

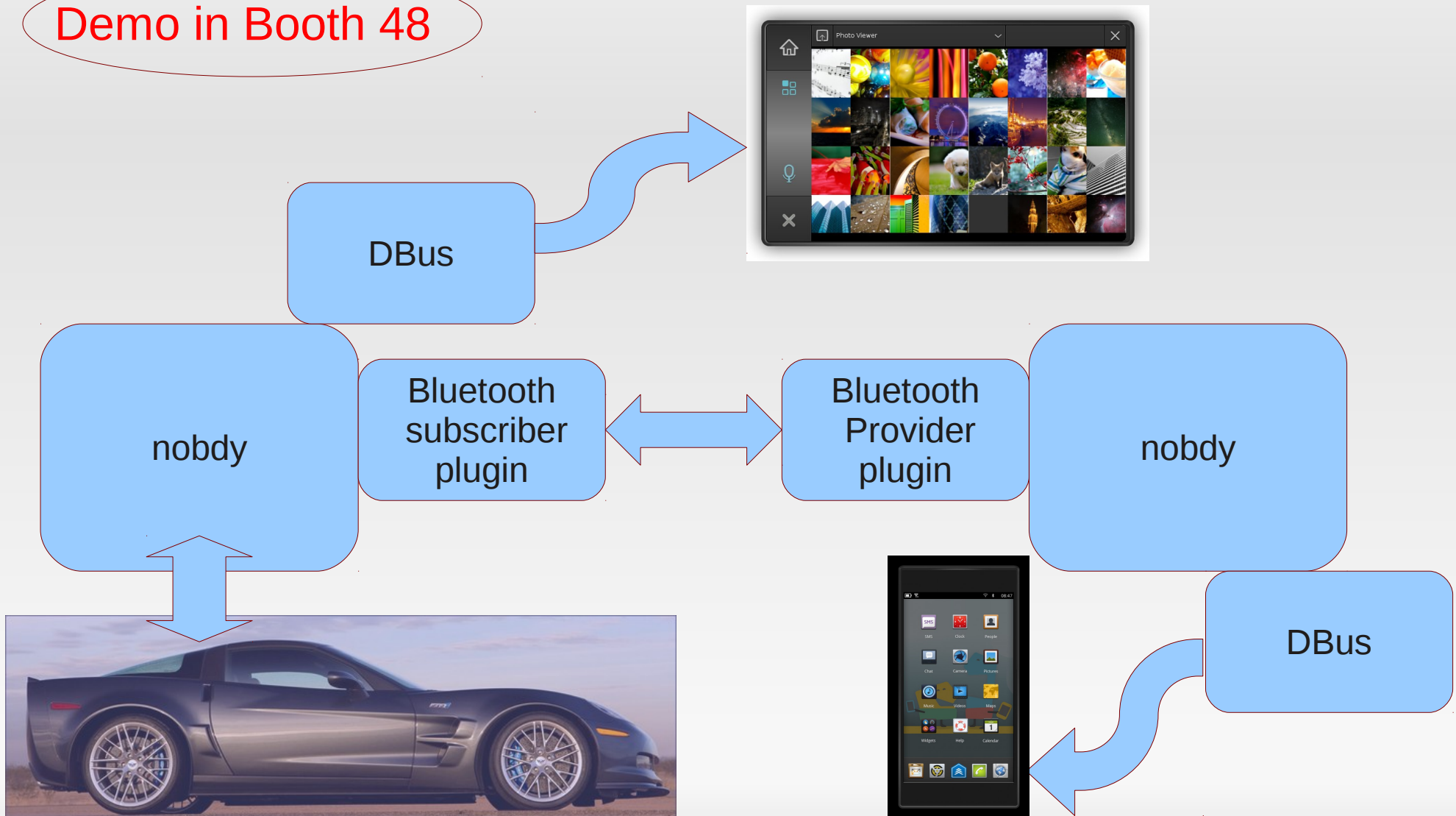
- ~\$40 scantools access vehicle data and controls
- nOBDy runs on any tablet/smartphone/laptop that supports Qt



<http://sf2011.meego.com/program/sessions/vehicle-communications-meego>

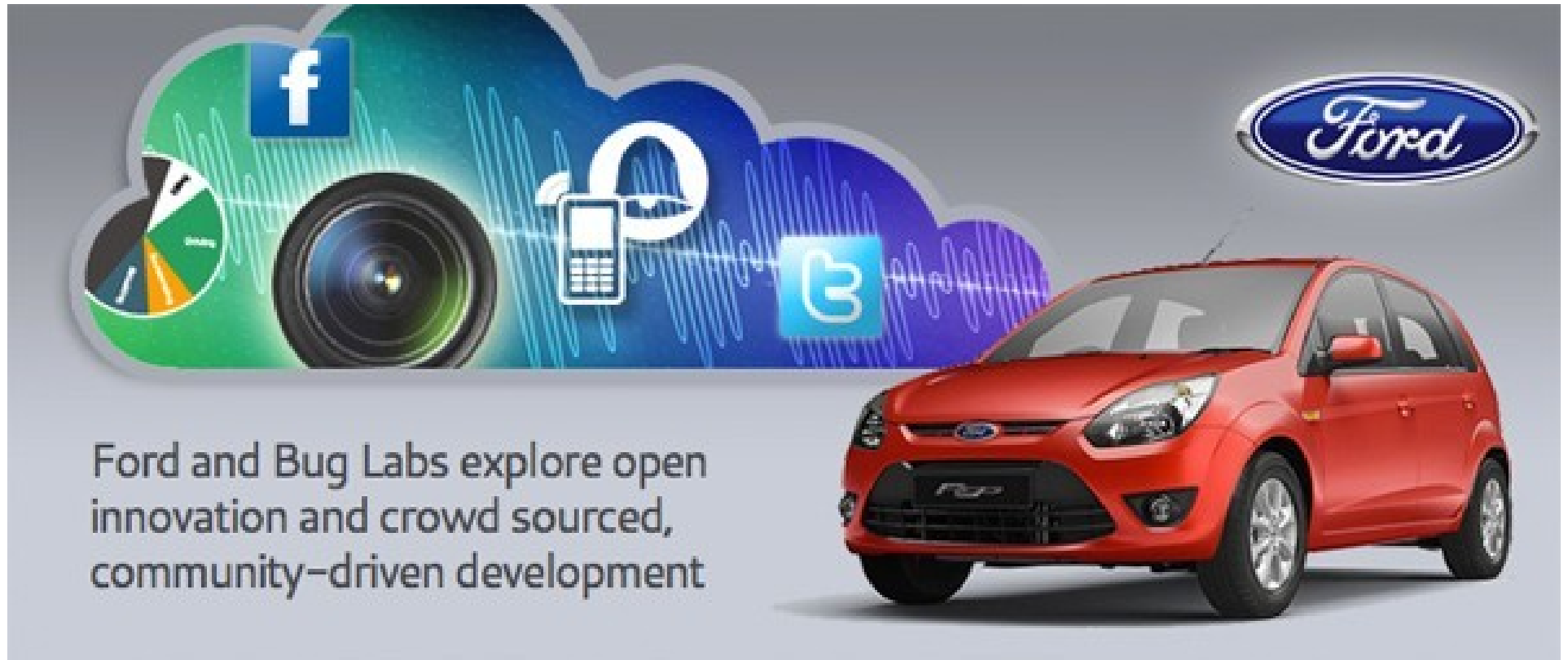
Tripzero: nOBdY is a GPL'ed plugin framework

Demo in Booth 48



Docs: http://nobody.wikia.com/wiki/Nobody_Wiki

OpenXC project: AOADK (Android) CAN scanner



Status: limited developer pre-release

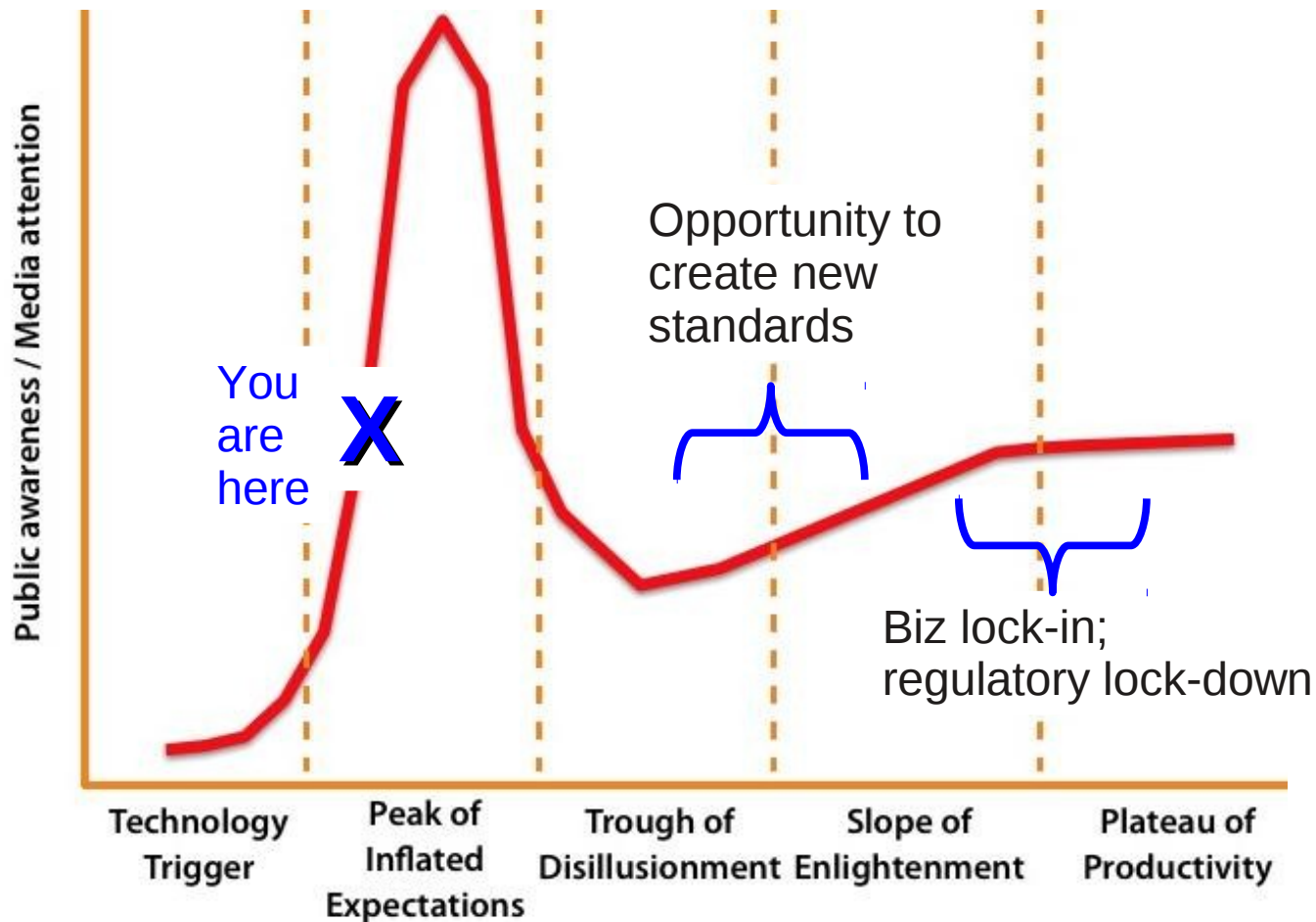
What can we contribute?

- App that autosubmits your destination information from car nav system to casual carpooling website
- “Where's the cheapest gas within a mile of the highway between here and where my tank will be empty?”
- “Bump” pairing with friends' vehicles to enable proximity alerts
- IRC, identica, diaspora, PGP integration

How to get involved

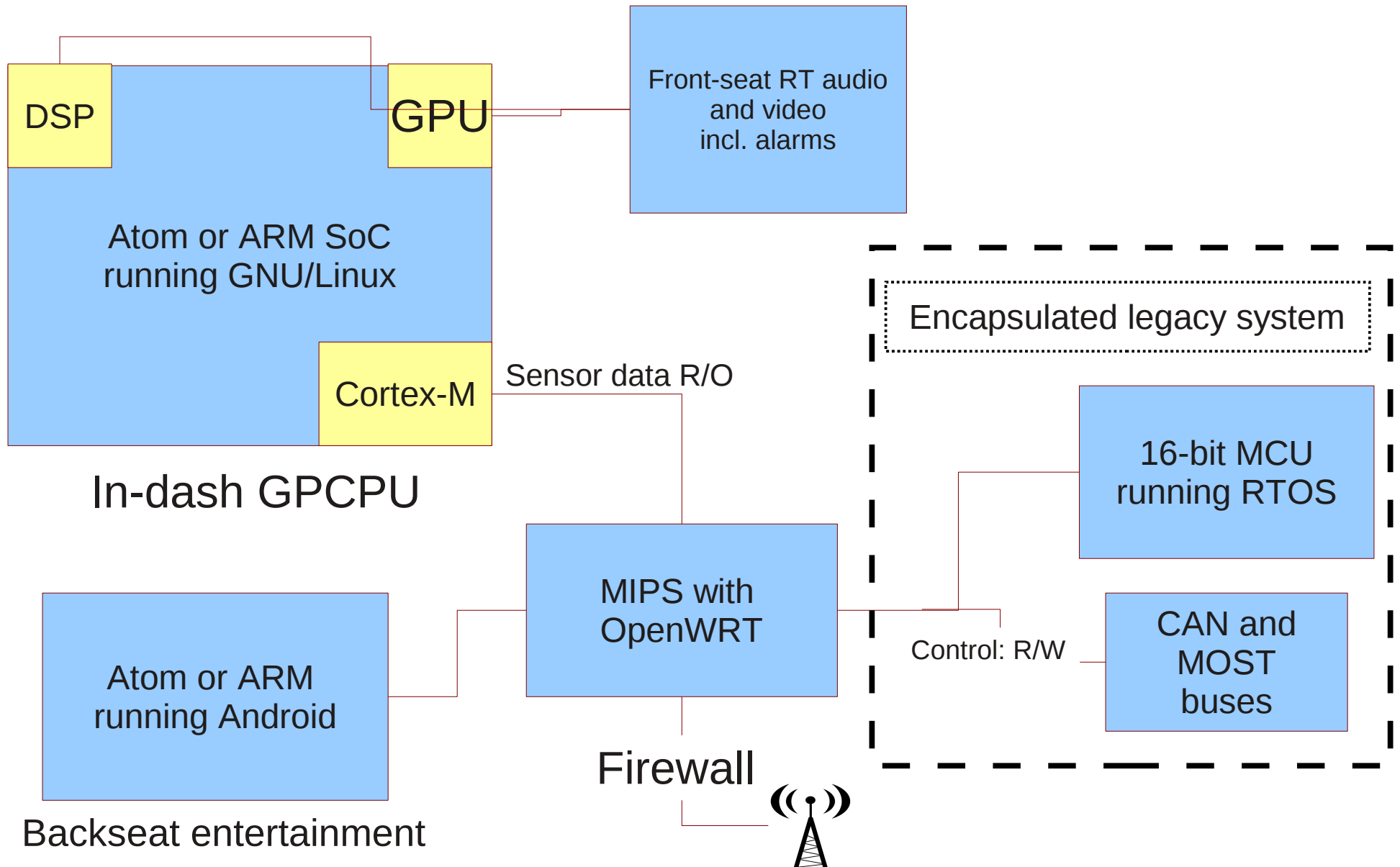
- Work on an automotive or intelligent transport open source project
- Develop for one of the car manufacturer's new app stores
- Buy a car that runs Linux
- Ask car dealers what OS the car runs, and say you would prefer Linux
- “Linux Inside” bumper stickers? Penguin swallowing an MS logo?

Summary: don't let this moment pass!



Thanks to Intel and Texas Instruments for HW donations.

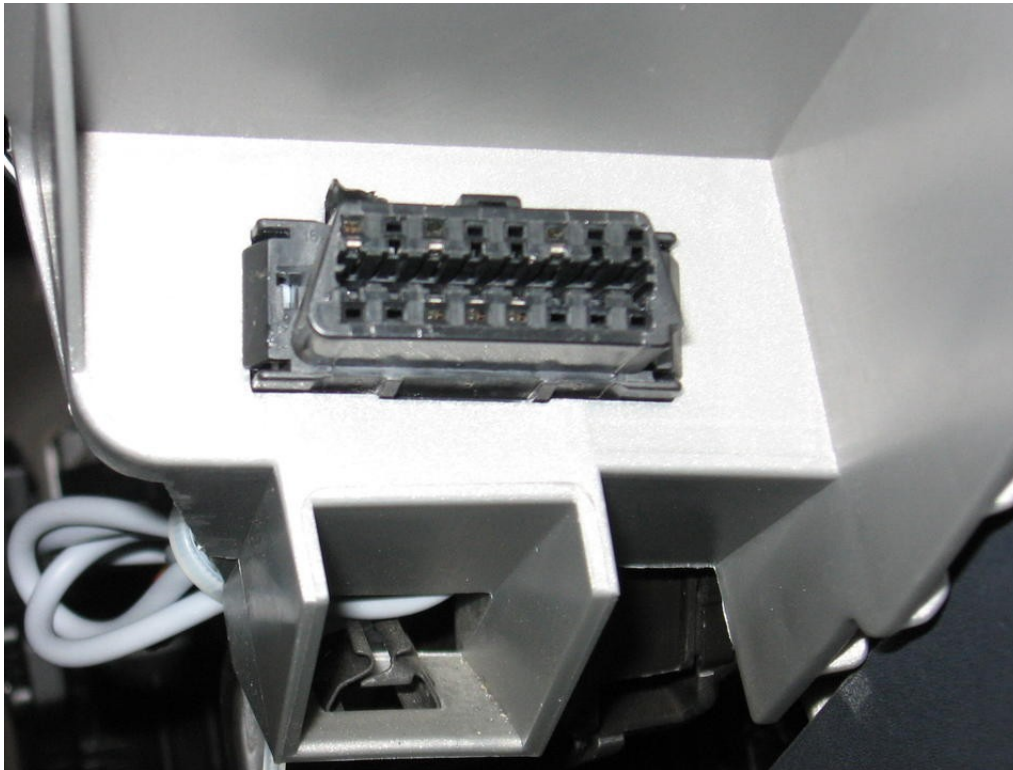
Trades parts count for security?



Problem: what IVI HW should devs use?

- ARM dominates, but Atom strong in IVI.
- Atom HW with CAN bus and GPS is costly: use dongles.
- ARM boards (e.g. BeagleBoard) cheaper.
- Multiple displays and controls needed.
- Touch, voice, video gesture, joystick?

Smog check connector = access to vehicle sensors



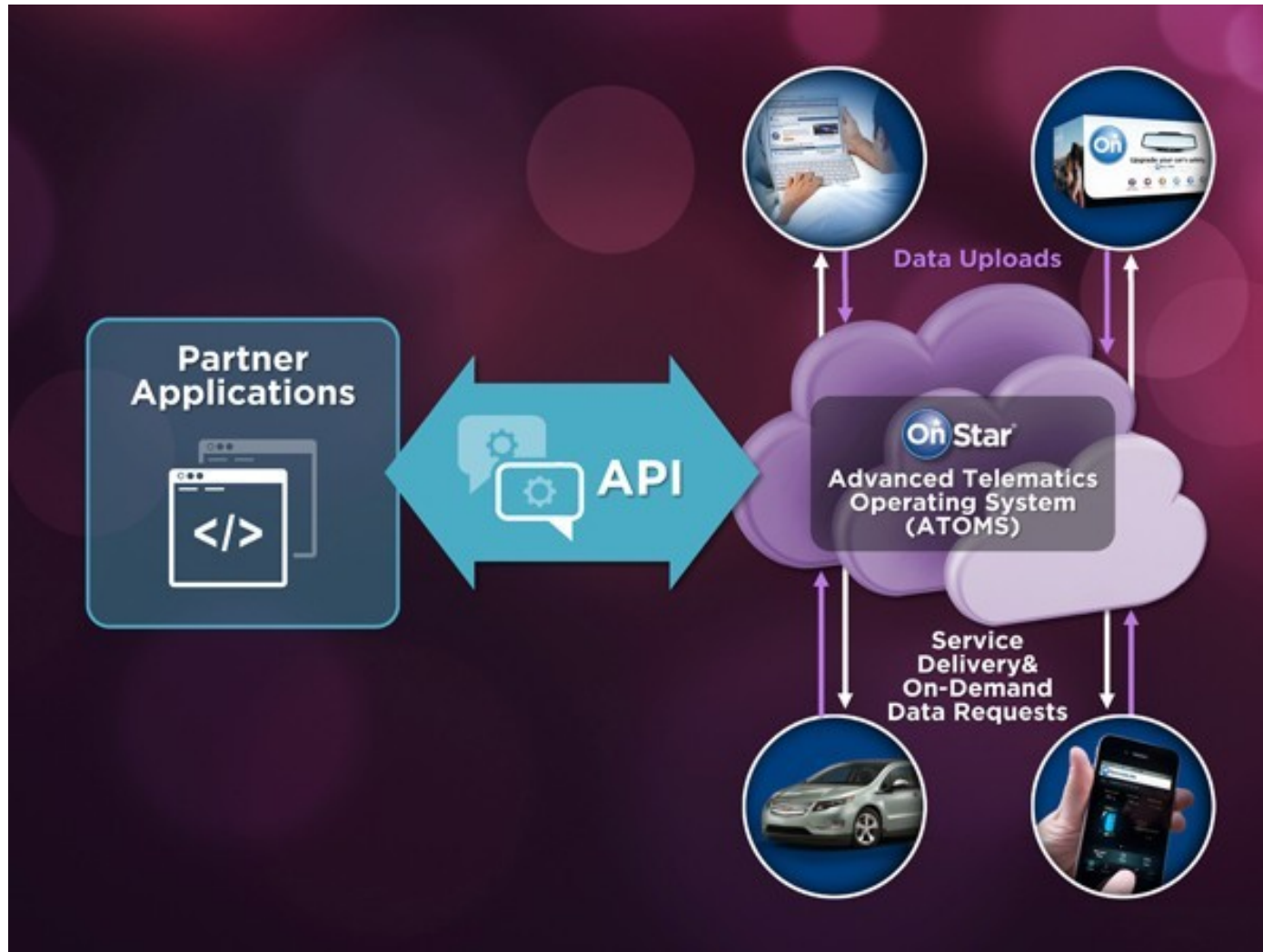
OBD-II connector on left of steering wheel sees dozens of ECUs, sensors and controls via serial bus

GFDL

Features of nOBDy

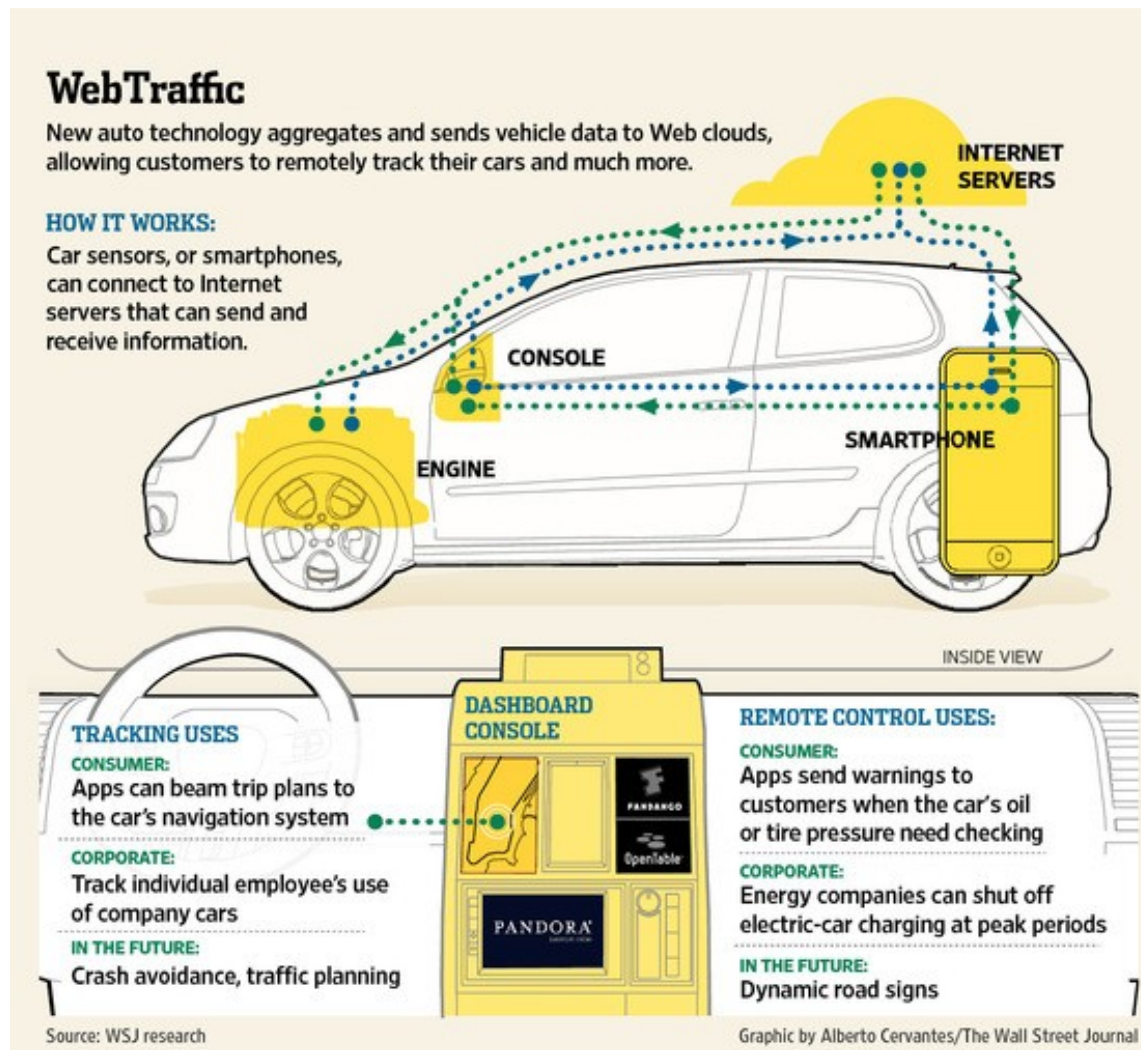
- Based on Qt toolkit and QML (Qt Modelling Language)
 - Booths 24 (Qt) and 67 (ICS)
- TCP, Bluetooth, D-Bus support
- Websocket/HTML5 browser interface based on JQuery Mobile
- Provides communications interface to CAN (Controller Area Network) vehicle data bus
- GPLv2, source on gitorious
- Based on libobd, OBDGPSLogger and gpssd projects
- Available as .deb and (soon) RPM packages

Cadillac User Experience based on MontaVista



Status: SDK expected, Spring 2012

Back-end “cloud programming” in IVI



nOBdY's stack

Your Qt, QML or Javascript application here!

nOBdY plugin framework

QML

JQuery

HTML5

Qt

OpenLayers

OBDGPSLogger

OpenStreetMap

gpsd

libobd

Linux kernel and device drivers

New plugins that talk TCP can be written in any language.

IVI UX Additional Features

IVI UX: media player, instrument cluster, RSE, navigation, diagnostic surround view, hands-free phone

IVI app frameworks: vehicle sensor data access, vehicle control, Terminal Mode, touch and gesture input

IVI API layer: multi-screen video, multi-zone audio, consumer electronic device connectivity, inertia-based application control

Core OS layer:

Sensor framework	Noise suppression
Split-screen video	OTA software updating
Speech recognition	Tethered device indexing
Speech synthesis	Phone synchronization
Acoustic echo cancellation	Multi-user support

Kernel layer: <250ms boot, power management, vehicle buses

Drivers: automotive button/knob input devices, vehicle data sensors

Courtesy
Nathan P. Willis,
<http://tinyurl.com/3m4loer>

How to get involved: community projects

- NOBDy wiki:

http://nobody.wikia.com/wiki/Nobody_Wiki



- OBDGPSLogger: <http://icculus.org/obdgpslogger/>



- LibOBD:

http://libobd.wikia.com/wiki/Libobd_Wiki

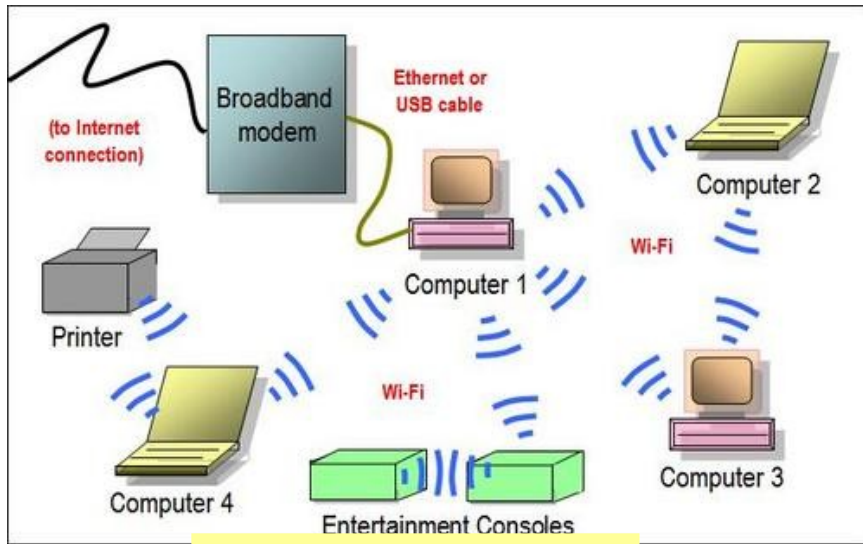


- OBDref: <https://github.com/canurabus/obdref>
- Mp3car: <http://www.mp3car.com/>

How to get involved: corporate-backed FLOSS

- OpenXC: <http://openxcplatform.com/>
- Ubuntu IVI Remix:
<http://linux.softpedia.com/progDownload/Ubuntu-IVI-Remix-Download-78078.html>
- Renault R-Link (Android):
<http://www.renault.com/en/innovation/plaisir-et-confort/pages/r-link.aspx>
- Bosch-ETAS Busmaster: <https://github.com/rbei-etas/busmaster>

Opportunity: save energy through *ad hoc* networking



Use this . . .



to save energy . . .



with cars, too: 802.11p WAVE.