

Next-Generation In-vehicle Software Opportunities



Alison Chaiken
alchaiken@gmail.com
<http://she-devel.com/>



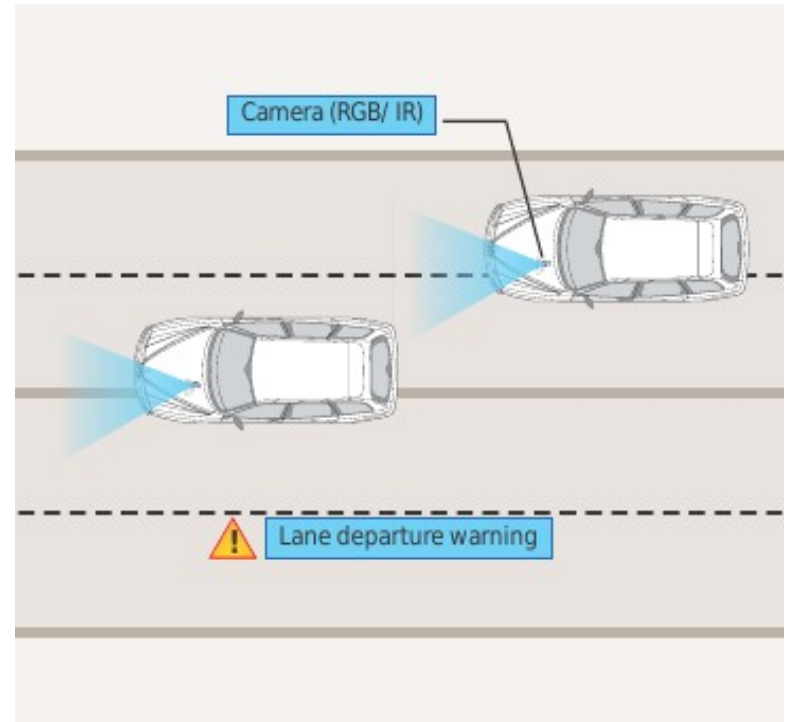
Outline

- Evolving opportunities for IVI
- HW platforms for IVI development
- nOBDy, ExoPC and Pandaboard demos

What is “in-vehicle infotainment”?



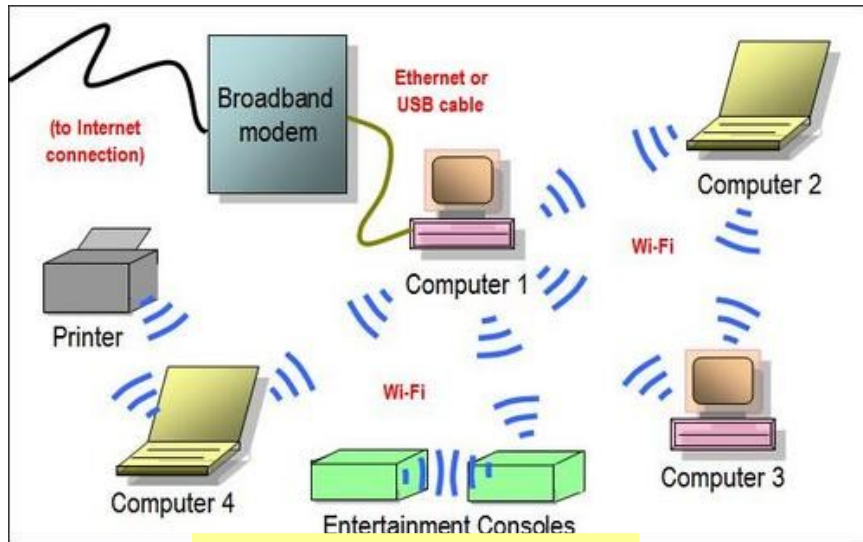
1st gen: available



Courtesy Tata Consultancy Services

2nd gen: pipeline

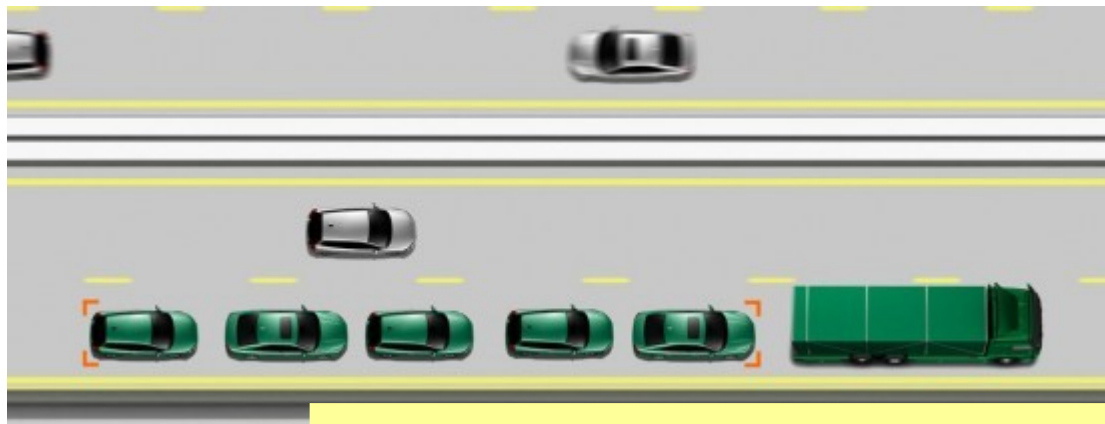
Opportunity: save energy through *ad hoc* networking



Use this . . .

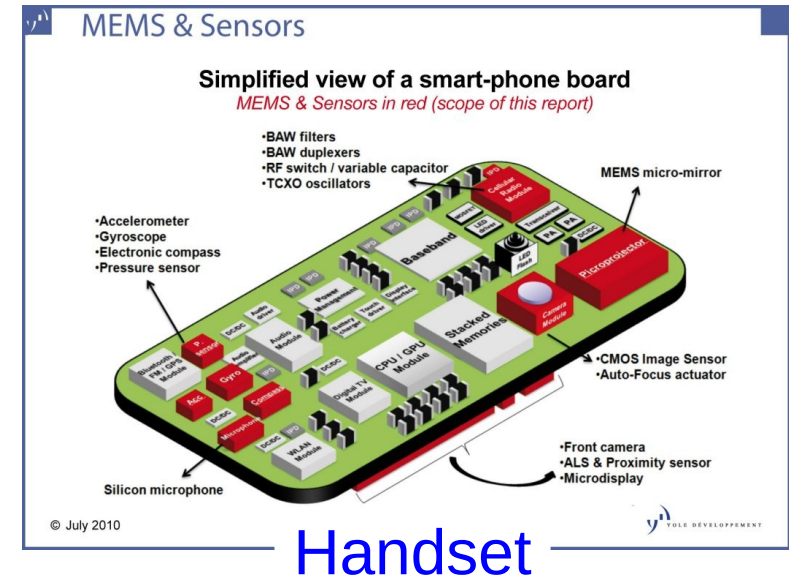
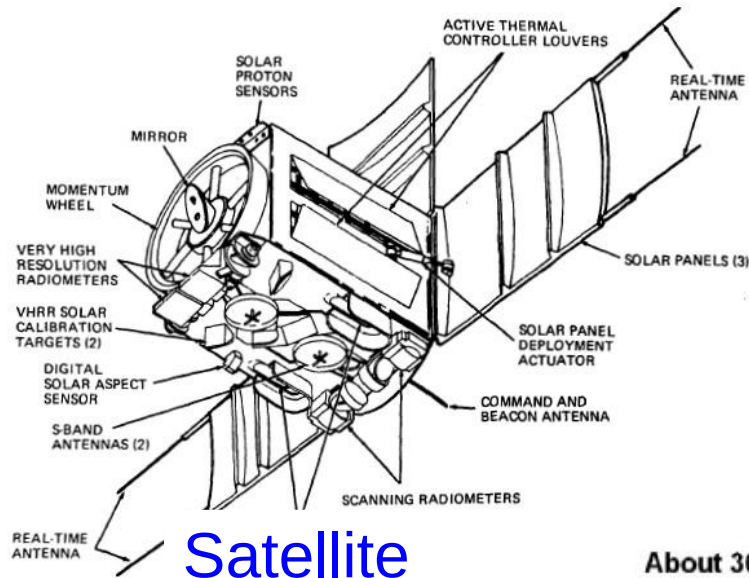


to save energy . . .



with cars, too: 802.11p WAVE.

Opportunity: Mobile sensor platform data fusion/mining



About 30 electric/electronic systems and more than 100 sensors

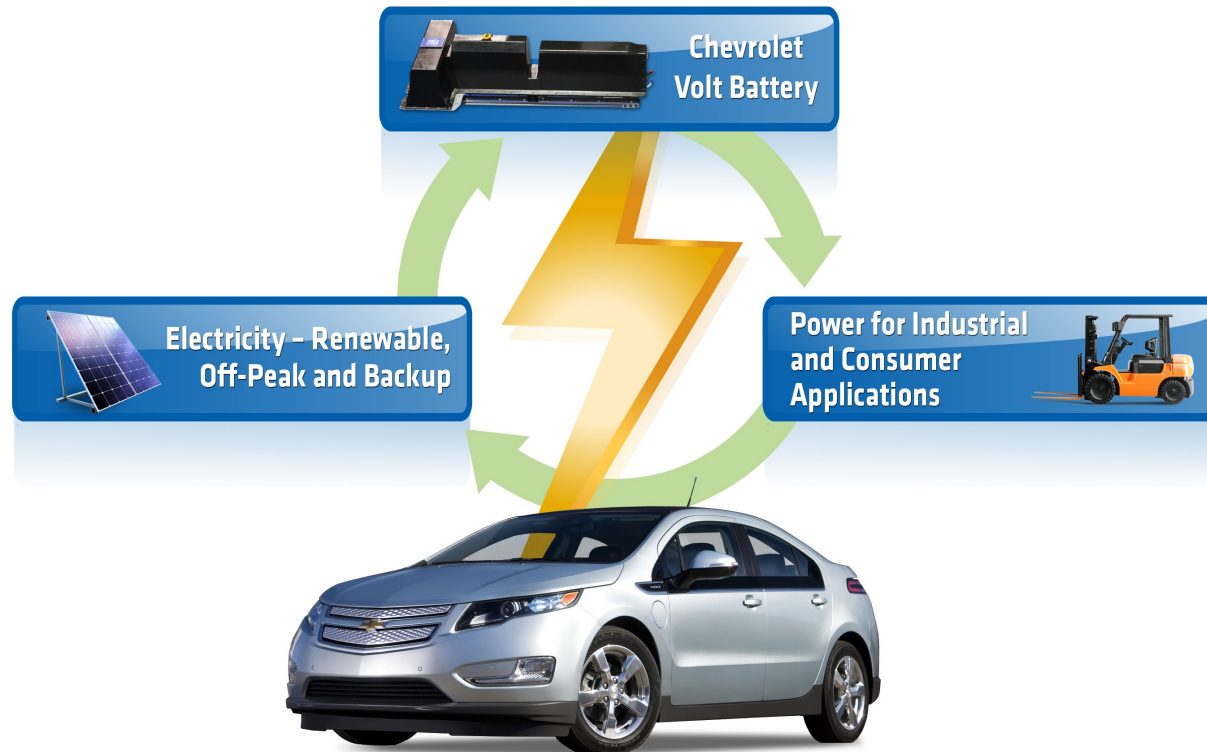


System	Abb.	Sensors			
Distronic	DTR	3	Common-rail diesel injection	CDI	11
Electron. controlled transmission	ECT	9	Automatic air condition	AAC	13
Roof control unit	RCU	7	Active body control	ABC	12
Antilock braking system	ABS	4	Tire pressure monitoring	TPM	11
Central locking system	ZV	3	Elektron. stability program	ESP	14
Dyn. beam levelling	LWR	6	Parktronic system	PTS	12

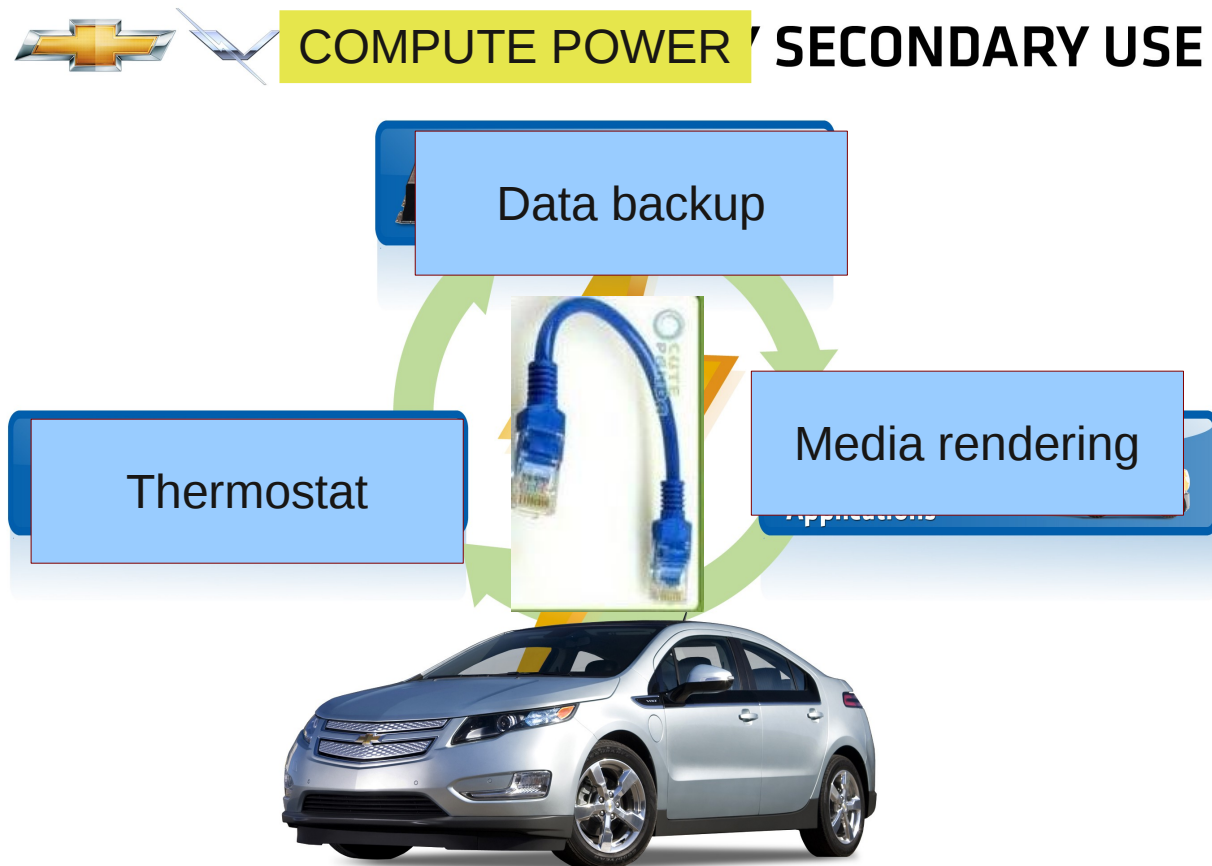
Figure 1: Car functions and the respective sensors (source: based on DaimlerChrysler)

Familiar idea: car as load-levelling power storage

BATTERY SECONDARY USE

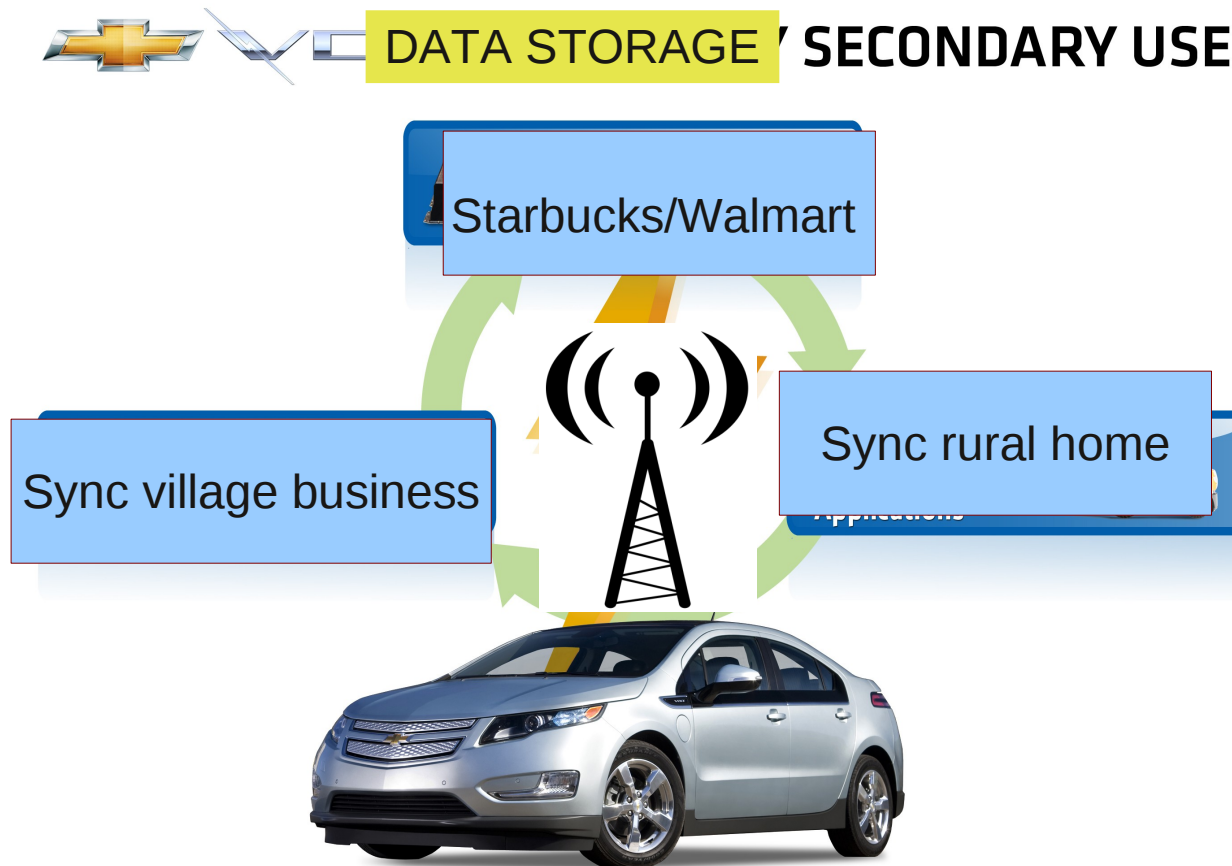


Extension: connected car can be main CPU for the home



Hot water heater, furnace and computer in garage . . .

Extension: From “sneakernet” to “tirennet”



Napster:iTunes::Wardriving:Download as a Service

“Adjacent” business opportunities

- ♦ Automakers do not want to enter smart grid business.
 - ♦ ABB does.
- ♦ Do not want to enter the home computer business.
 - ♦ A lot of Sili Valley startups do.
- ♦ Do not want to enter the “tirennet” business.
 - ♦ Chinese, Indian partners do.

Bay Area IVI participants



WIND RIVER



Honda Research Institute USA



New L.A. factory



TATA CONSULTANCY SERVICES

ARM



BOSCH





Find

a Meetup Group

Start

a Meetup Group

Silicon Valley Automotive Open Source



Mountain View, CA

Founded Oct 10, 2011

Members 73

Group reviews 2

Upcoming Meetups 1

Past Meetups 1

Our calendar 

Organizers:

Alison Chaiken,

Amar Kona, Gary,

Ronald Bjork



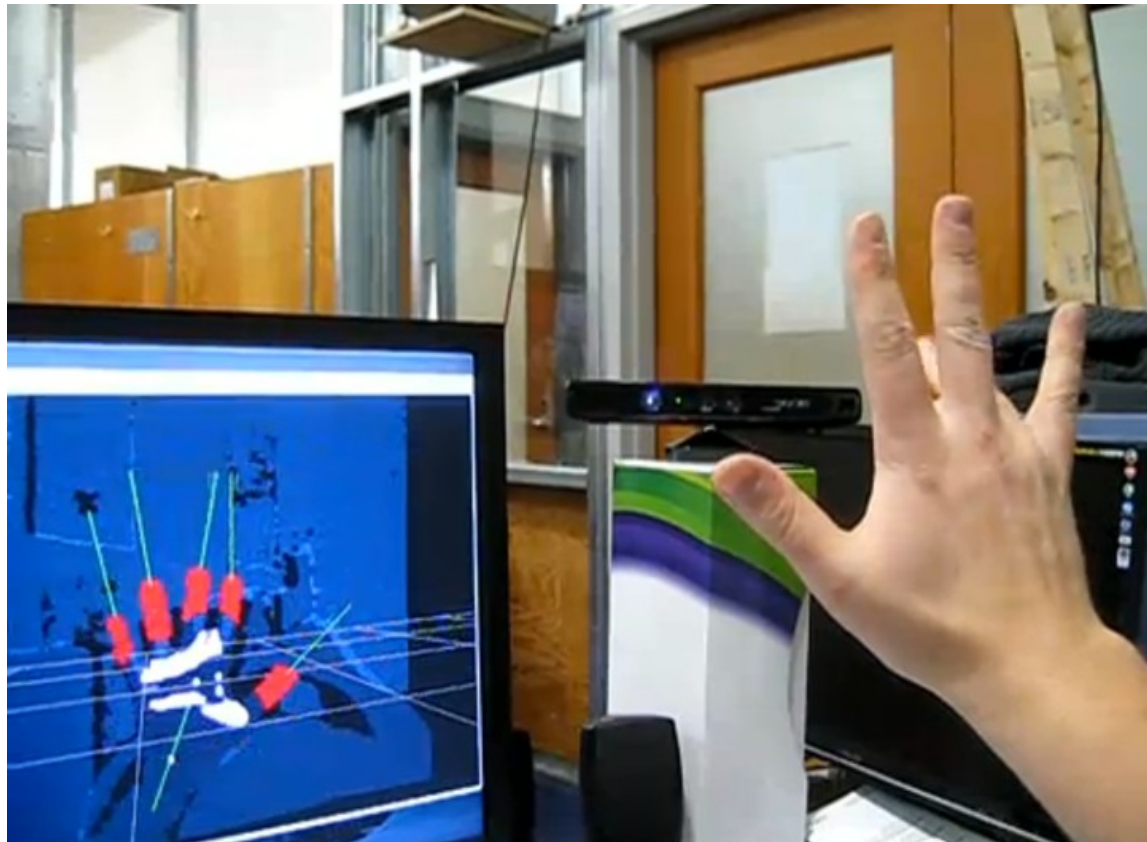
[View The Leadership Team](#)

Challenges for IVI

- Security in a multi-user, mobile, often unattended device
- Safety: not “kill -9” but kill dead!
- Novel hardware and architecture
- Not a phone or desktop: little-understood UI/UX

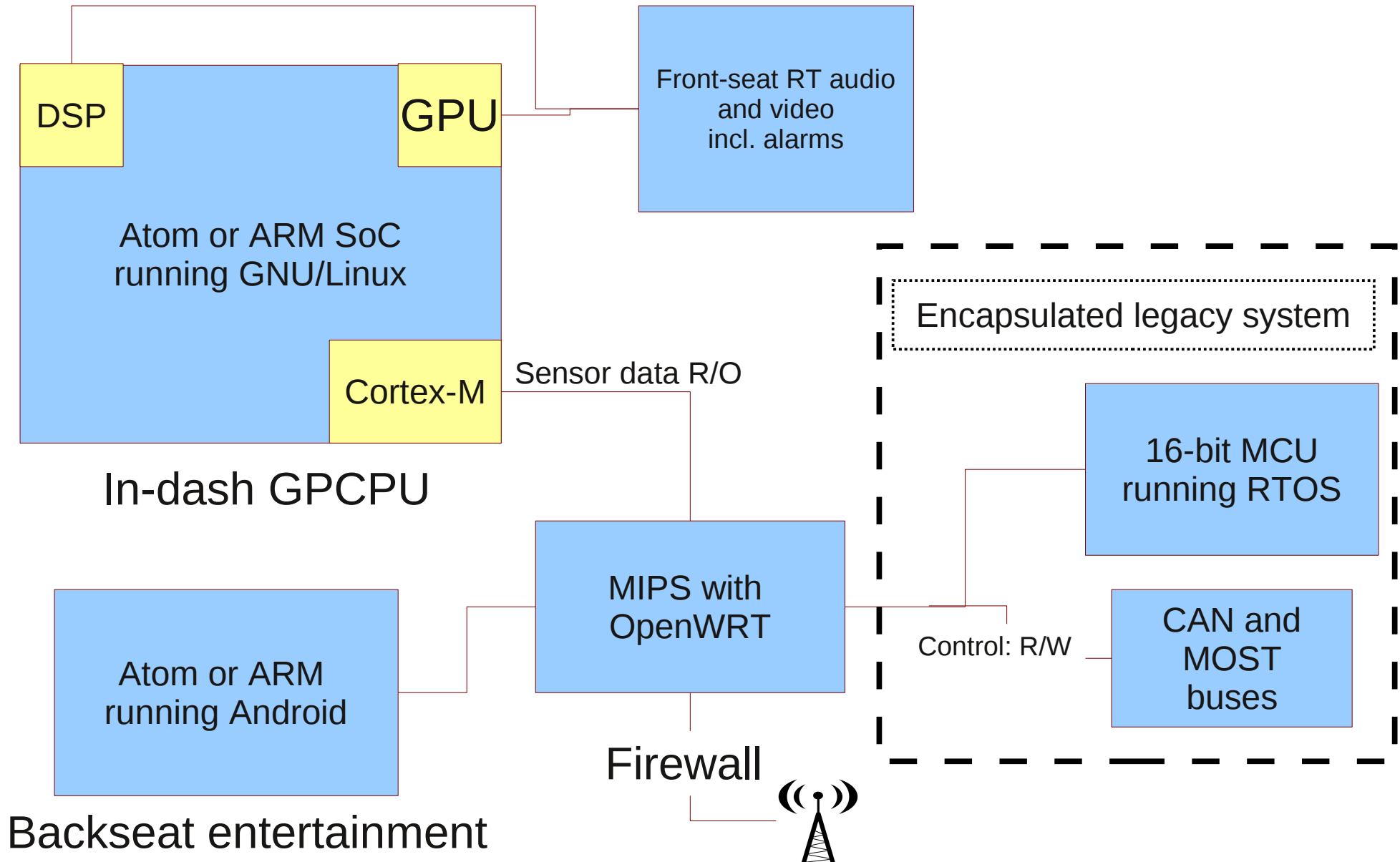
UI: What kind of controls?

- Touchscreen, video gesture, joystick, voice, haptic?



Kinect piano: <https://www.youtube.com/watch?v=kf3G-DXqt6Y>

Novel architecture trades parts count for security



Maybe Android from Open *Handset* Alliance?

- ♦ Inherently single user.
- ♦ Text ads required for Android Market?



- ♦ Open source, not open development.
- ♦ Amazon and B&N more ready to deal?

2011 Linux Kernel Summit: no need to choose?

Many of the changes in the Android kernel have been blocked from merging into the mainline, but Android shipped it anyway, and it now has many millions of users. . . . how we should treat the Android code?

Linus took the microphone and stated that, simply, code that actually is used is the code that is actually worth something. The Android code is certainly being used . . . when code has millions of users, we have to say "yes" to it.

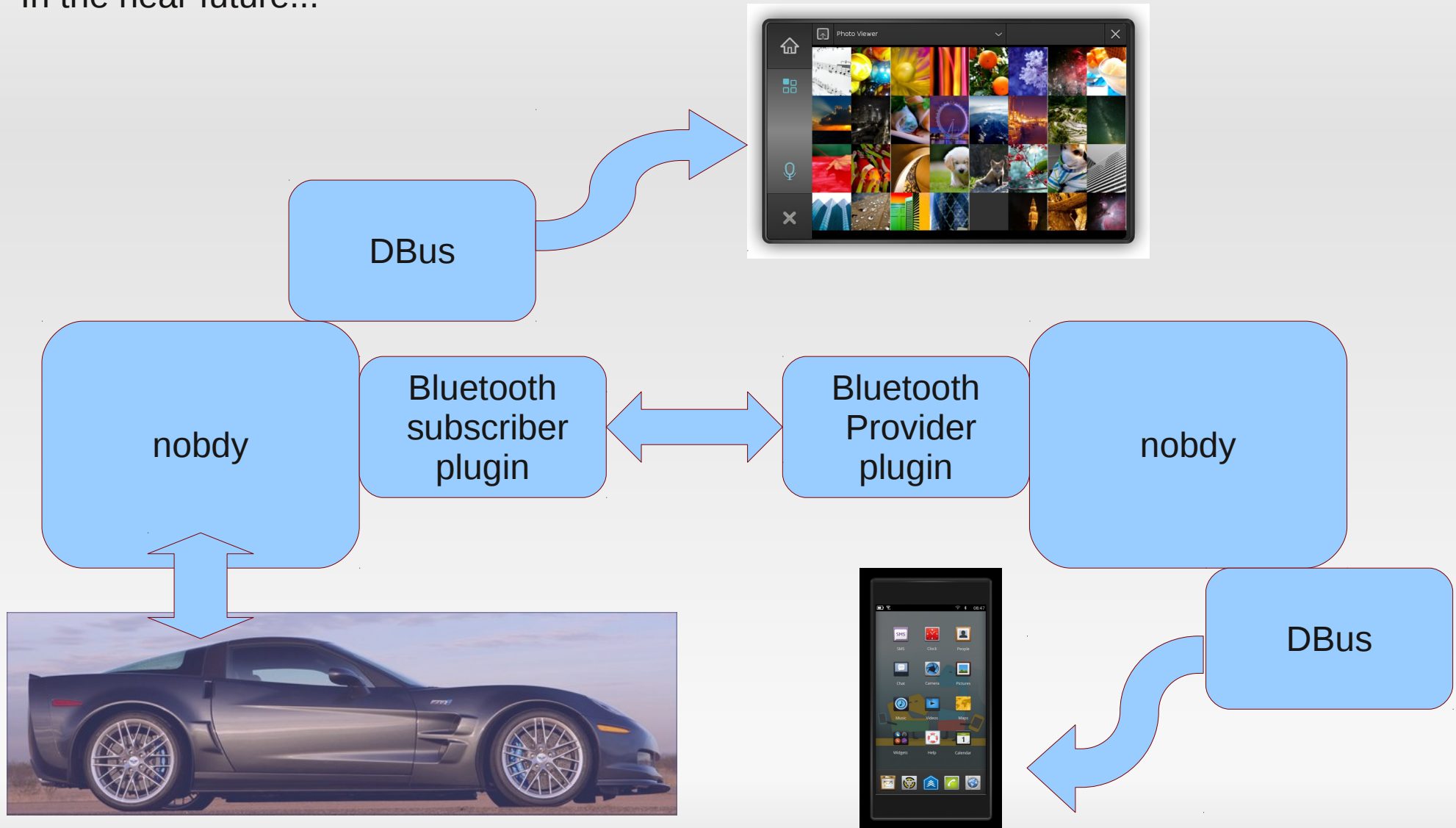
MeeGo IVI 1.2 Home Screen



Intel: Tizen-IVI will have large overlap with MeeGo.

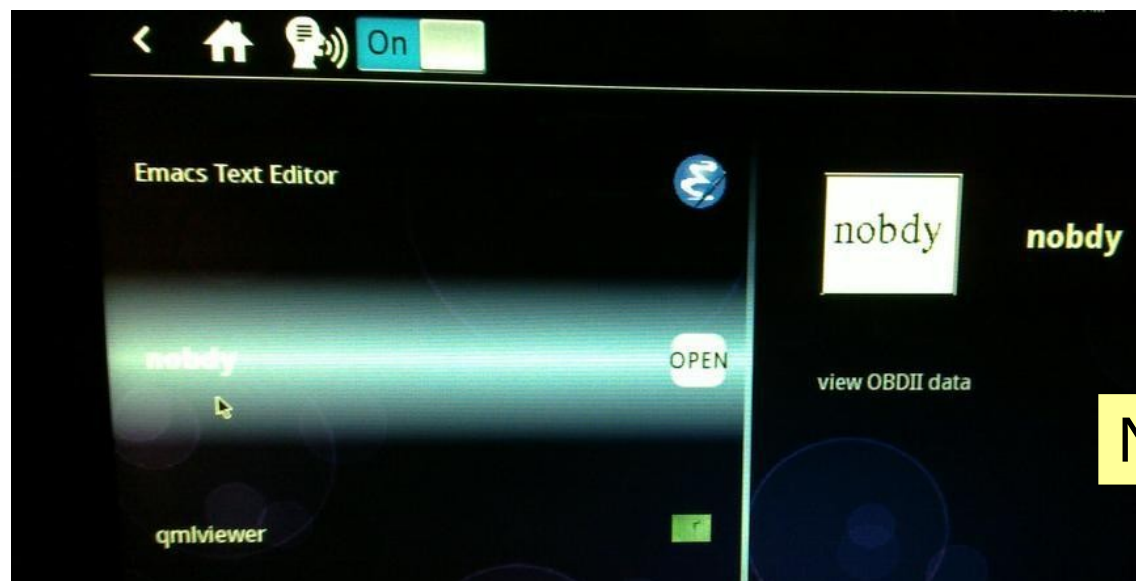
Tripzero: Handset/Tablet + meego ivi

In the near future...

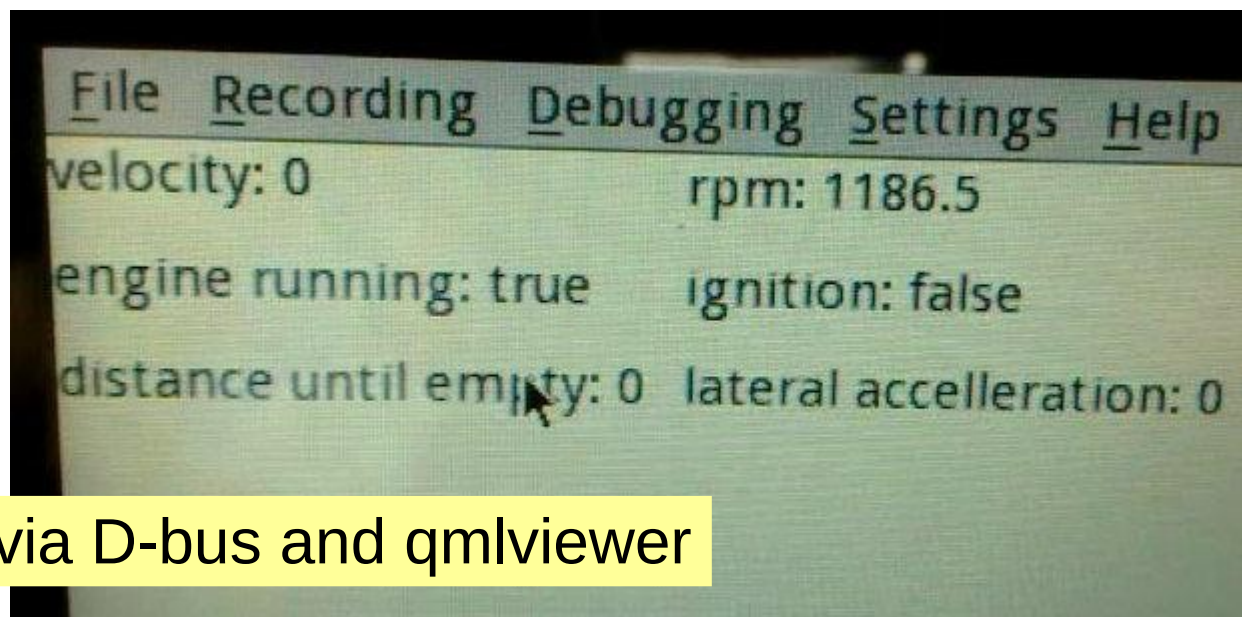


<http://sf2011.meego.com/program/sessions/vehicle-communications-meego>

Nobody on (unsupported) ExoPC Atom Slate and OMAP4 Pandaboard



Nobody in scrollwheel menu

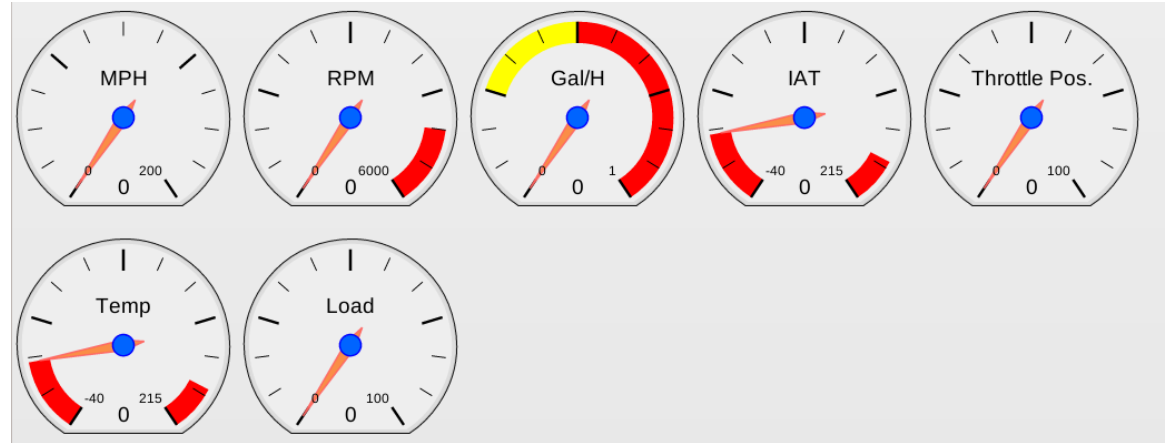


Live data stream via D-bus and qmlviewer

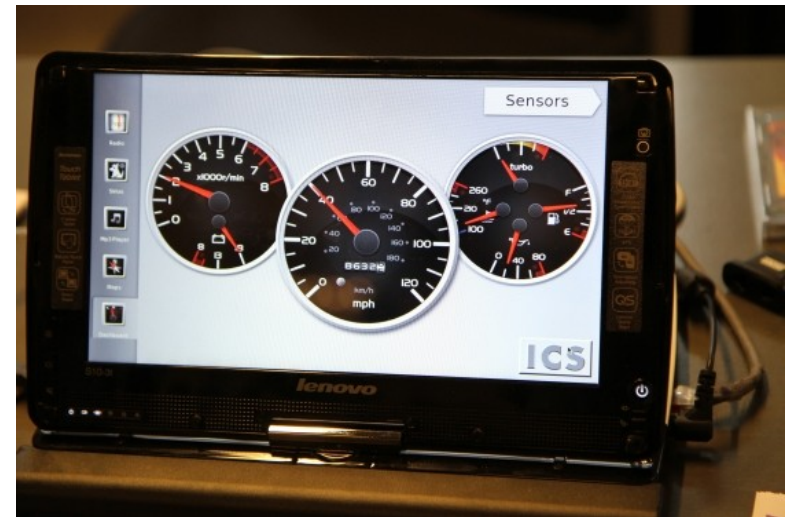
Linux OBDII Software



Torque from [Android Market](#)
(not open source)



New nobody Qjson UI from tripzero



[ICS IVI demo](#) by Justin Noel

Goal: real-time mileage display for ICE vehicles

- Real-time display in Prius:
 - Is an important factor in its popularity;
 - Illustrates the user empowerment of timely data
- Real-time mileage is just the beginning of what data-mining can accomplish.
- Killer app: “What's the cheapest gas within 1 mile of the freeway between me and an empty tank?
Between me and my destination?”

Summary

- Linux opportunities at all levels: HW, accessories, embedded, platform, apps, entrepreneurs and big companies.
- Finding HW for development remains a problem: iKar PC? IMX53 Quickstart?
- *Many* local companies and developers want to play.
- Prediction: automotive is where Linux will show most growth.

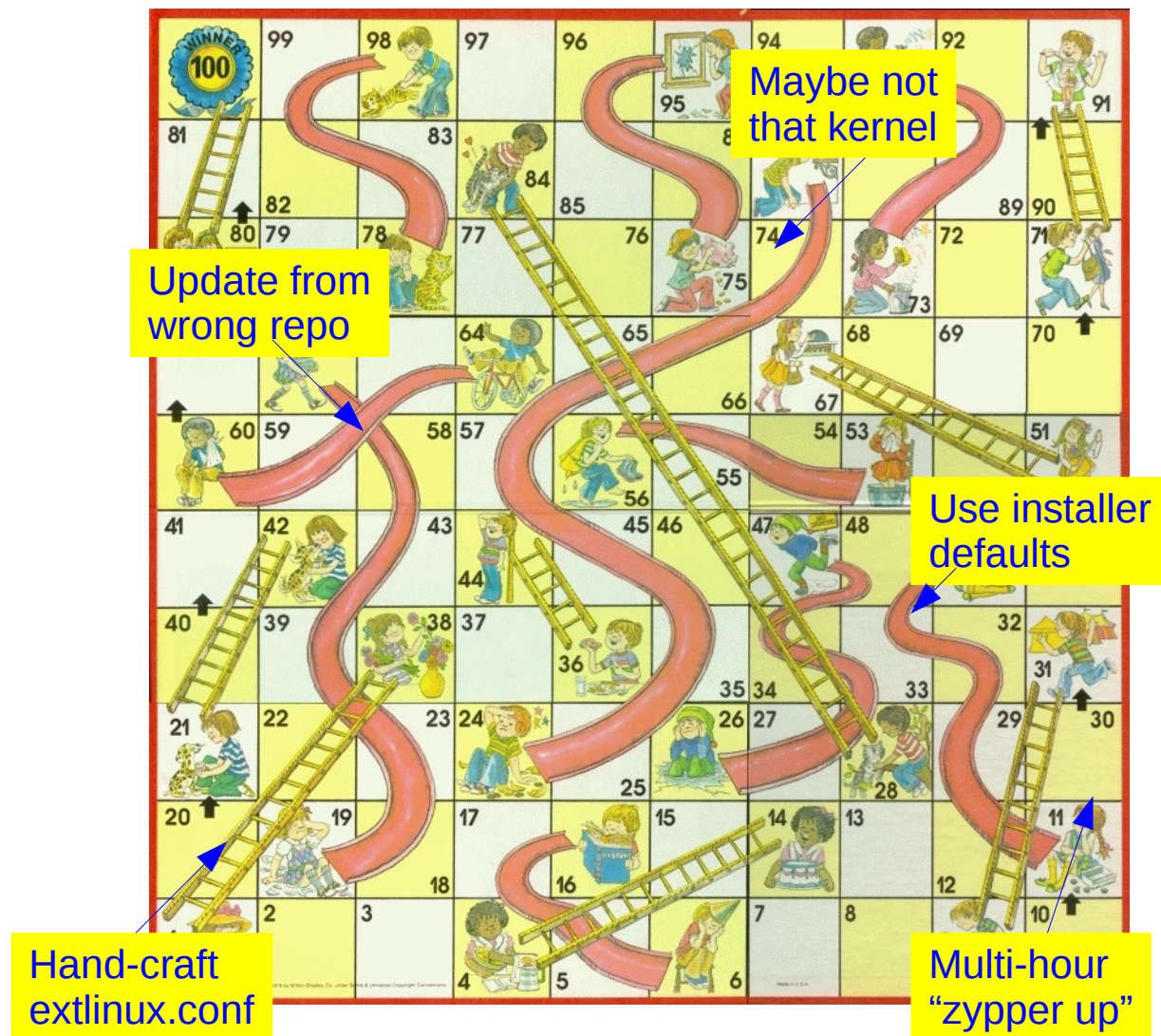
Resources 1: Hardware platforms for IVI

- ARM set-top box: [Trimslice](#), \$219 with Arch or MeeGo.
- ARM board: [FreeScale i.MX QuickStart](#), \$149 w/ Ubuntu.
- Atom/x86 slate: [Ciara ExoPC Vibe](#), \$699 w/ Windows.
- Atom/x86 board: Intel [Black Sands](#), \$149 w/ reg, Android, Ubuntu or MeeGo.
- ARM boards: T.I. [BeagleBoard](#) (\$149), [PandaBoard](#) (\$179), Ubuntu or Android.
- Multiple displays and controls needed.
- Touch, voice, video, joystick, haptic devices and [drivers](#)?
- GPS dongles, CAN daughter cards . . .

Resources 2

- IVI wiki: <http://wiki.meego.com/In-vehicle>
- Official site: <http://meego.com/downloads/releases/1.2/meego-v1.2-in-vehicle-infotainment-ivi>
- Mailing list archive: <http://lists.meego.com/pipermail/meego-ivi>
- Mp3car.com
- #linuxice and #meego-ivi IRC on freenode.net
- nOBDy: wiki.openice.org/index.php?title=Nobdy
- My notes and instructions
 - on ExoPC: http://wiki.meego.com/MeeGo_IVI_on_ExoPC
 - on Pandaboard: http://wiki.meego.com/Hardware-accelerated_graphics_on_Pandaboard_using_MeeGo

MeeGo Hardware Adaptation Process



MeeGo-IVI on Atom and ARM Demo HW

- No SW support for HW available to small-medium businesses.
- Running IVI on ExoPC requires a mash-up of “Tablet Preview” and IVI UXes.
- Meego-ivi repos support EMGD graphics only
 - “zypper update” auto-overwrites drivers and X11 SO libraries.
- Stopped work on ARM-based Pandaboard due to missing hardfp PowerVR driver.

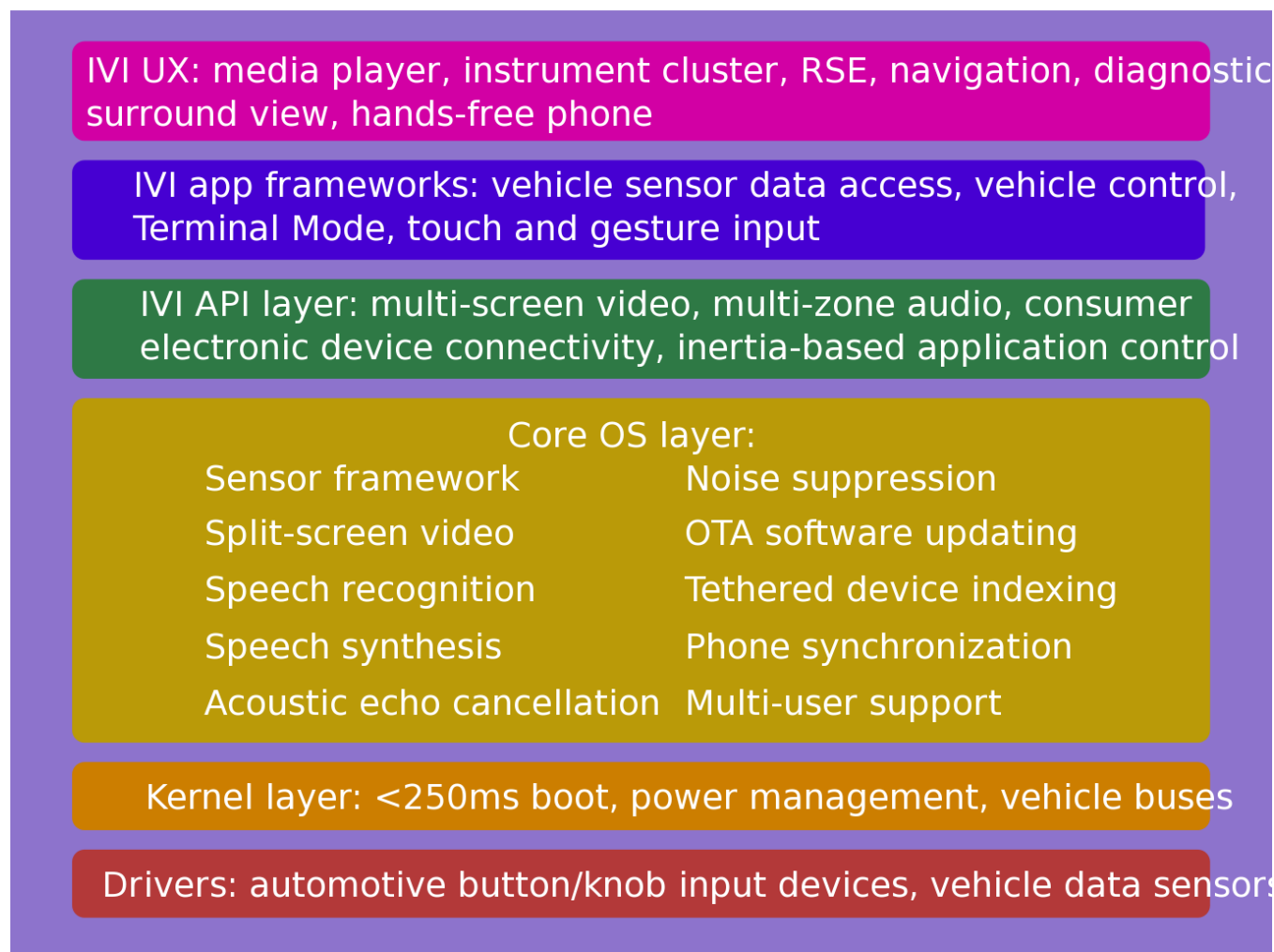
Hardware/Driver Challenge

CAN bus, MOST bus, wheel rotation sensors, oil level . . .



Not just RT audio, but RT video too!

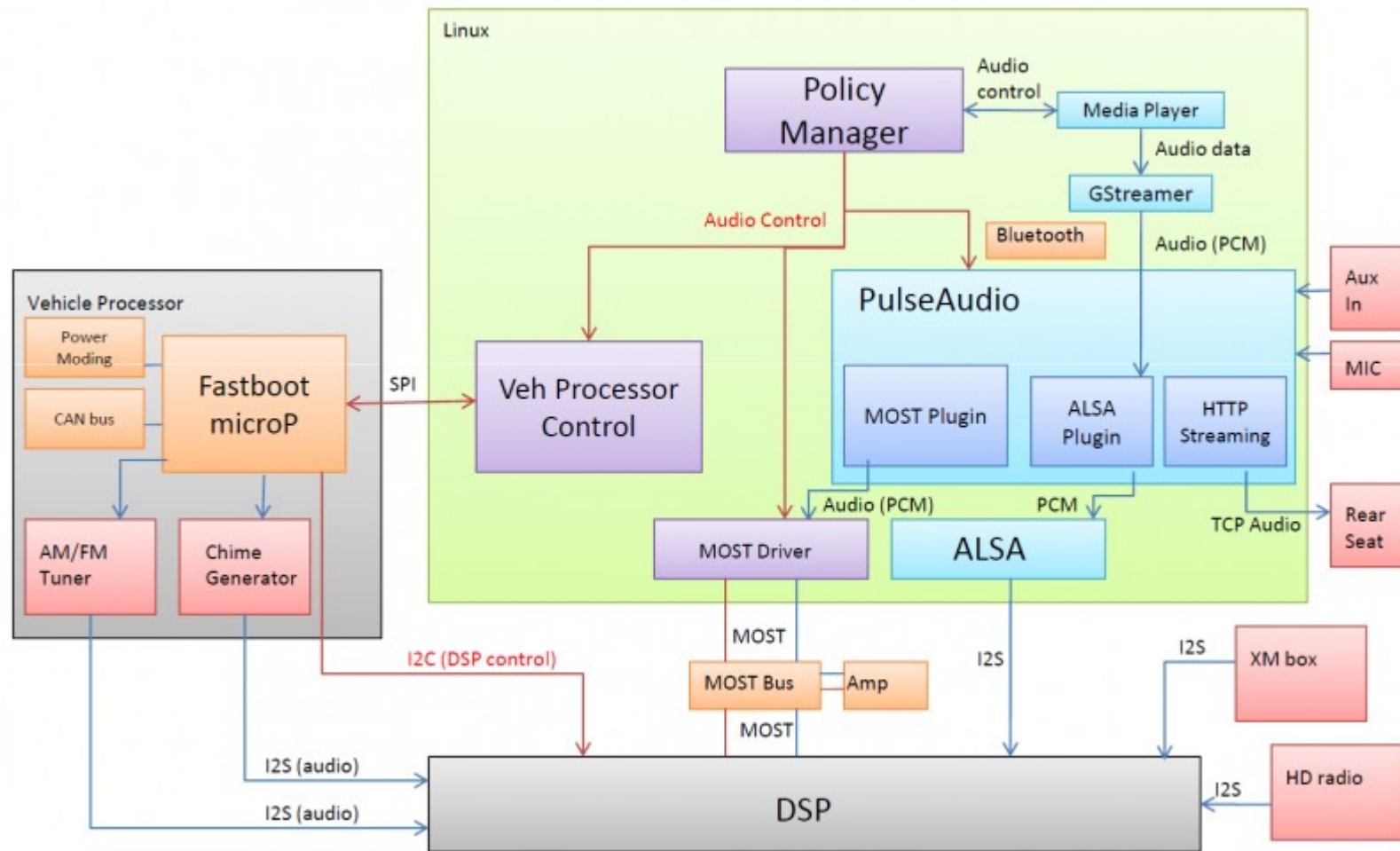
IVI UX Additional Features: MeeGo/Tizen



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

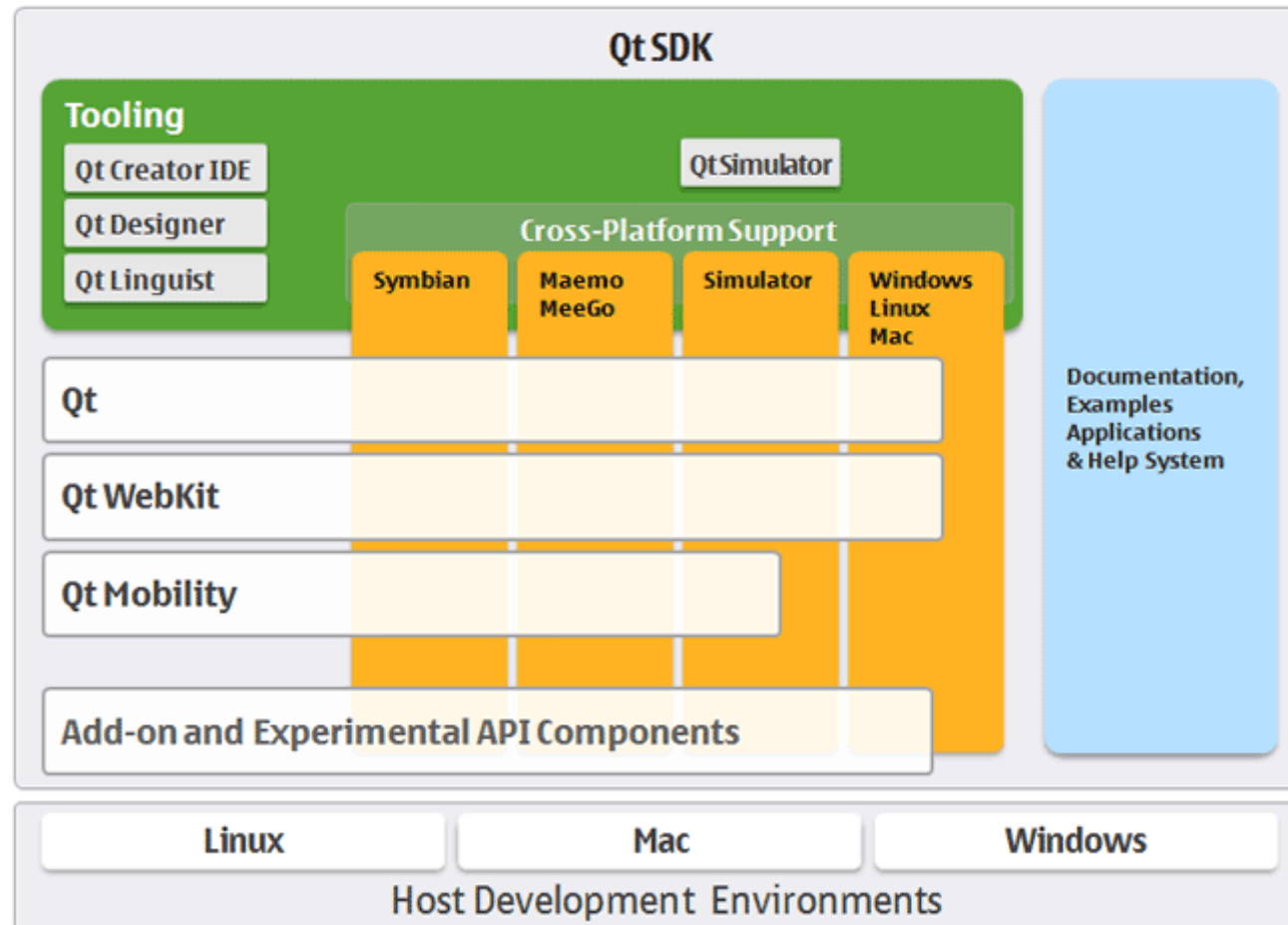
Many automotive players, few public announcements.

MeeGo IVI Audio Architecture



Courtesy Laci Jalics, Delphi.

How about MeeGo?



MeeGo = lightweight GNU/Linux with a Qt face.

100-Member auto SW alliance endorses Linux

3 August 2011, 13:38

« previous | next »

First four GENIVI compliant solutions approved

The GENIVI alliance for In-Vehicle Infotainment has announced a new compliance programme for member companies and the first four companies to offer approved compliant solutions: Canonical's Ubuntu IVI Remix, Mentor Graphics' Embedded IVI Base Platform, MontaVista's Automotive Technology Platform and Wind River's Platform for Infotainment.

All of the approved solutions run on Intel Atom and ARM architectures, except for MontaVista's



GENIVI is promulgating Linux standards for auto space.

Security: Linux isn't ready either



Backseat kids changing nav system's destination . . .
mechanic at body shop installs malware.

Safety: UI Design Space is Little Understood

What information does the driver need?



Prevent entertainment system from hogging resources (incl. Driver!).