Automotive: new frontier for mobile Linux

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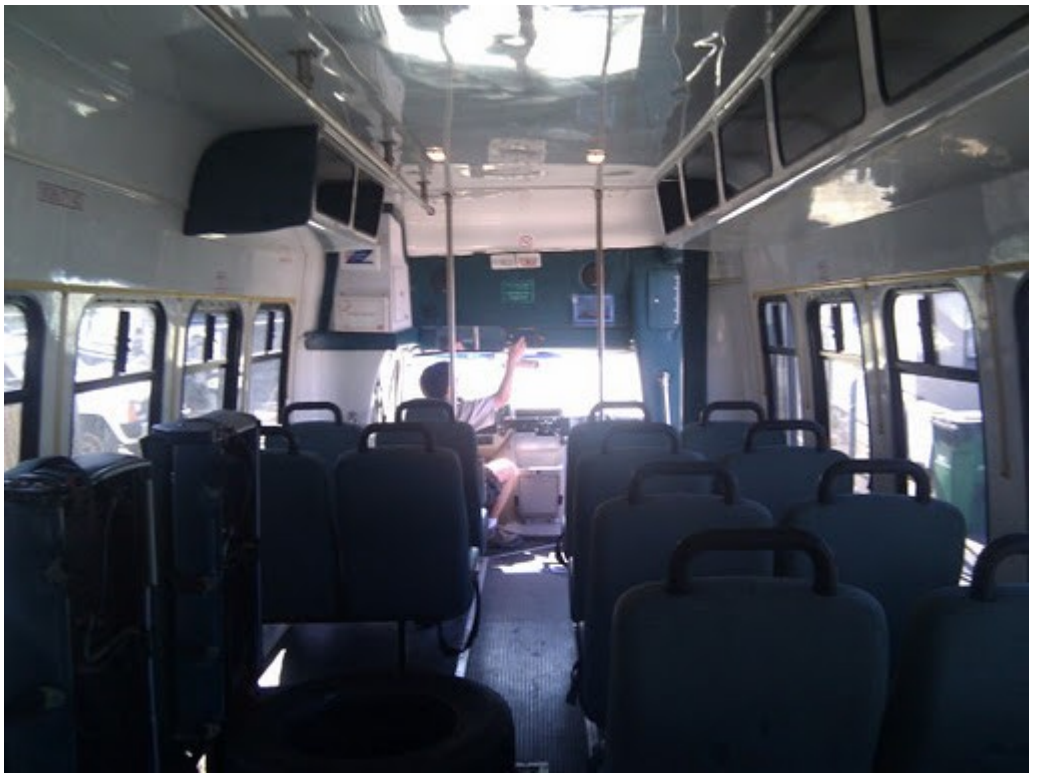
Advertisement: who wants to bus-pool to SCALE?



Katy's shuttle bus

100-Member auto SW alliance endorses Linux

3 August 2011, 13:38

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First four GENIVI compliant solutions approved

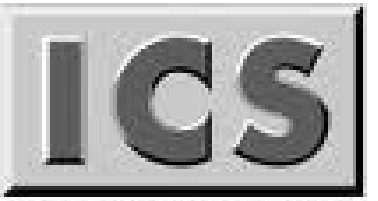
The GENIVI alliance for In-Vehicle Infotainment has announced a new compliance programme for member companies and the first four companies to offer approved compliant solutions: Canonical's Ubuntu IVI Remix, Mentor Graphics' Embedded IVI Base Platform, MontaVista's Automotive Technology Platform and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

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

http://www.h-online.com/open/news/item/First-four-GENIVI-compliant-solutions-approved-1317701.html

Bay Area IVI participants

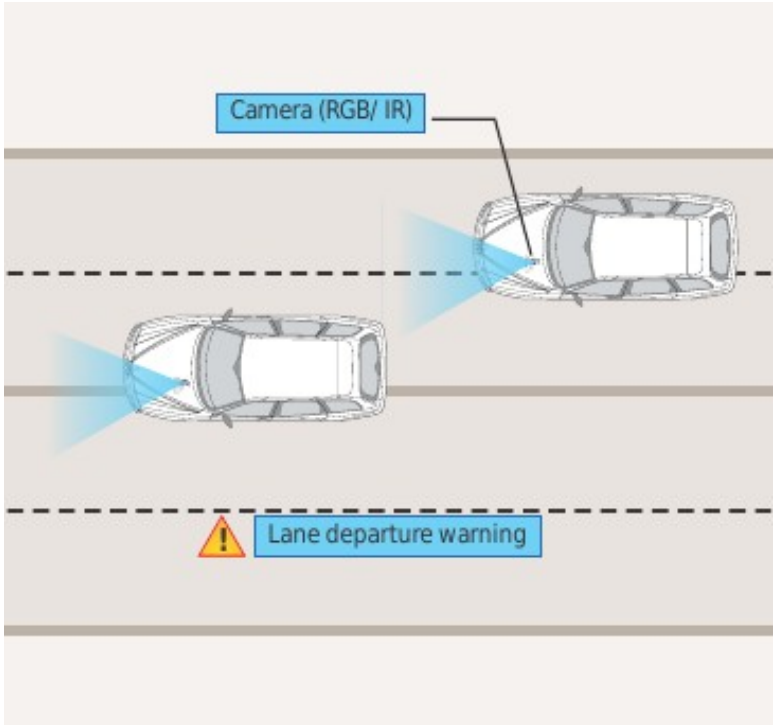
New L.A. factory



Outline

- Automotive software systems: IVI
- Major IVI projects and platforms
- HW platforms for IVI development
- nOBDy and ExoPC demos

What is “in-vehicle infotainment”?



Courtesy Tata Consultancy Services

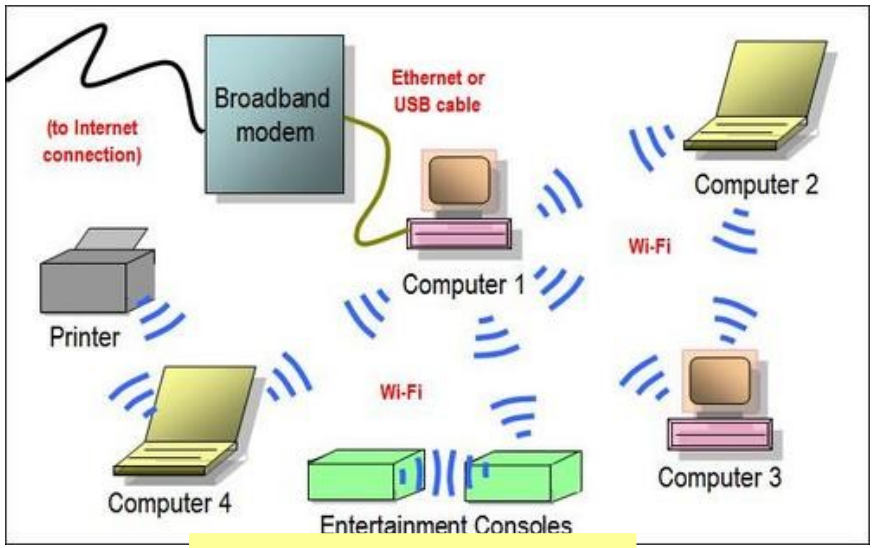
What “infotainment” calls to mind

What IVI could be

3 potential novel auto apps

- Saving fuel with *ad hoc* convoys
-
-

Opportunity: save energy through *ad hoc* networking



Use this . . .

to save energy . . .

with cars, too: 802.11p WAVE.

3 potential novel auto apps

- Saving fuel with *ad hoc* convoys
- Car as mobile data collection platform
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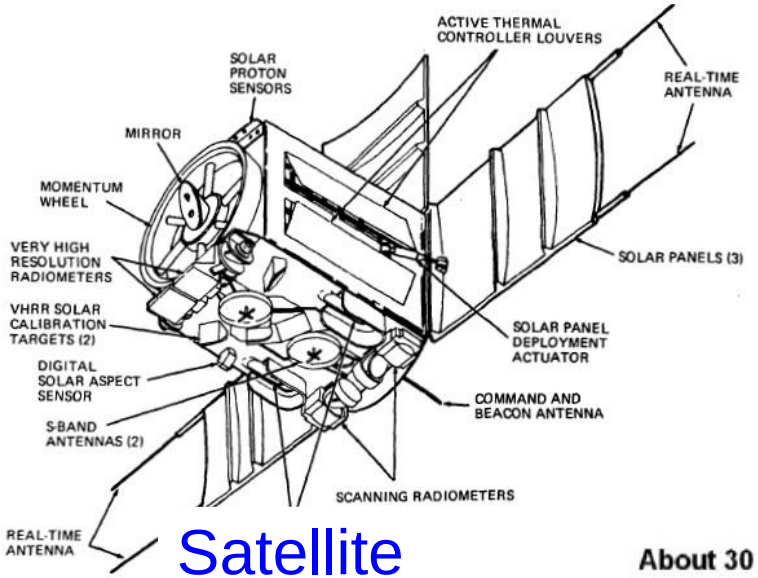
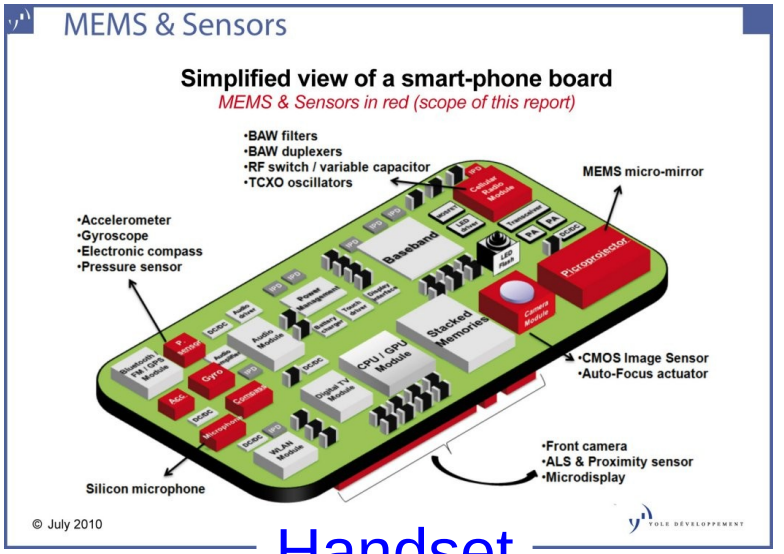
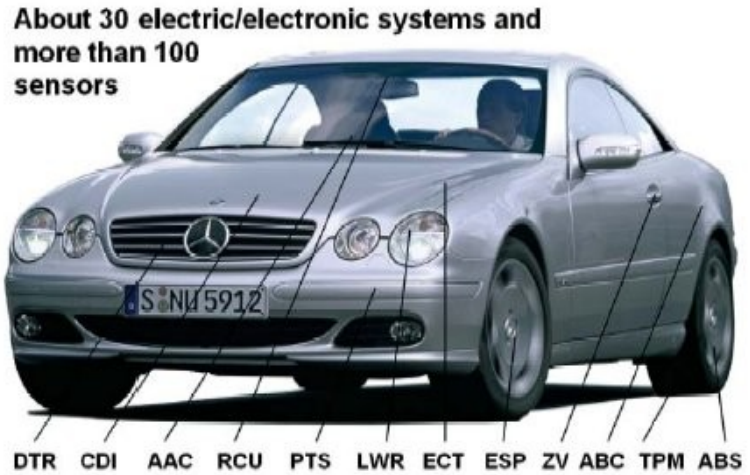
Opportunity: Mobile sensor platform data fusion/mining



Satellite



Handset



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)

3 potential novel auto apps

- Saving fuel with *ad hoc* convoys
- Car as mobile data collection platform
- Car as giant portable CPU and battery

Inserting smarts into big dumb docking stations

Dock the Atrix . . .

. . . or dock the car?

Cars can tether and sync rural businesses and homes?

4 challenges for IVI

- Security in a multi-user, mobile, often unattended device
-
-
-

Challenge 1: security

Microsoft Windows Automotive

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

4 challenges for IVI

- Security in a multi-user, mobile, often unattended device
- Safety: not “kill -9” but kill dead!
-
-

Challenge 2: safety

Driver gets alarms and has read-only access to many parameters.

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

4 challenges for IVI

- Security in a multi-user, mobile, often unattended device
- Safety of a complex system with power to kill
- Unique HW: device drivers!?
-

Challenge 3: HW needs

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

Not just RT audio, but RT video too!

4 challenges for IVI

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

Game-like Controls, Real Cars?

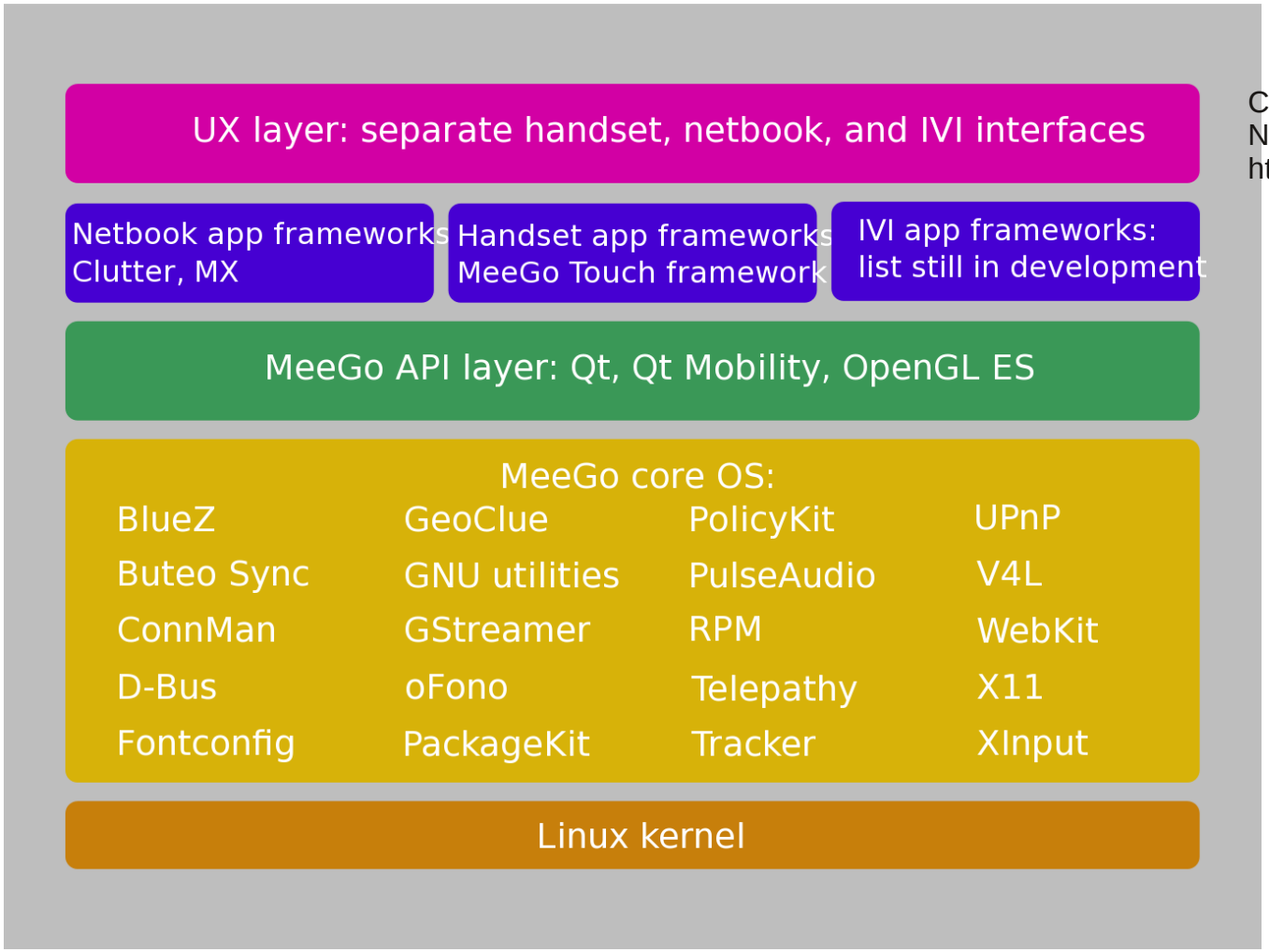
- Touchscreen, video gesture, joystick, voice, haptic?

http://funktion.catalystexhibit.com/2009/11/is-our-future-joystuck/

Maybe what we want is Android . . .

from the Open *Handset* Alliance?

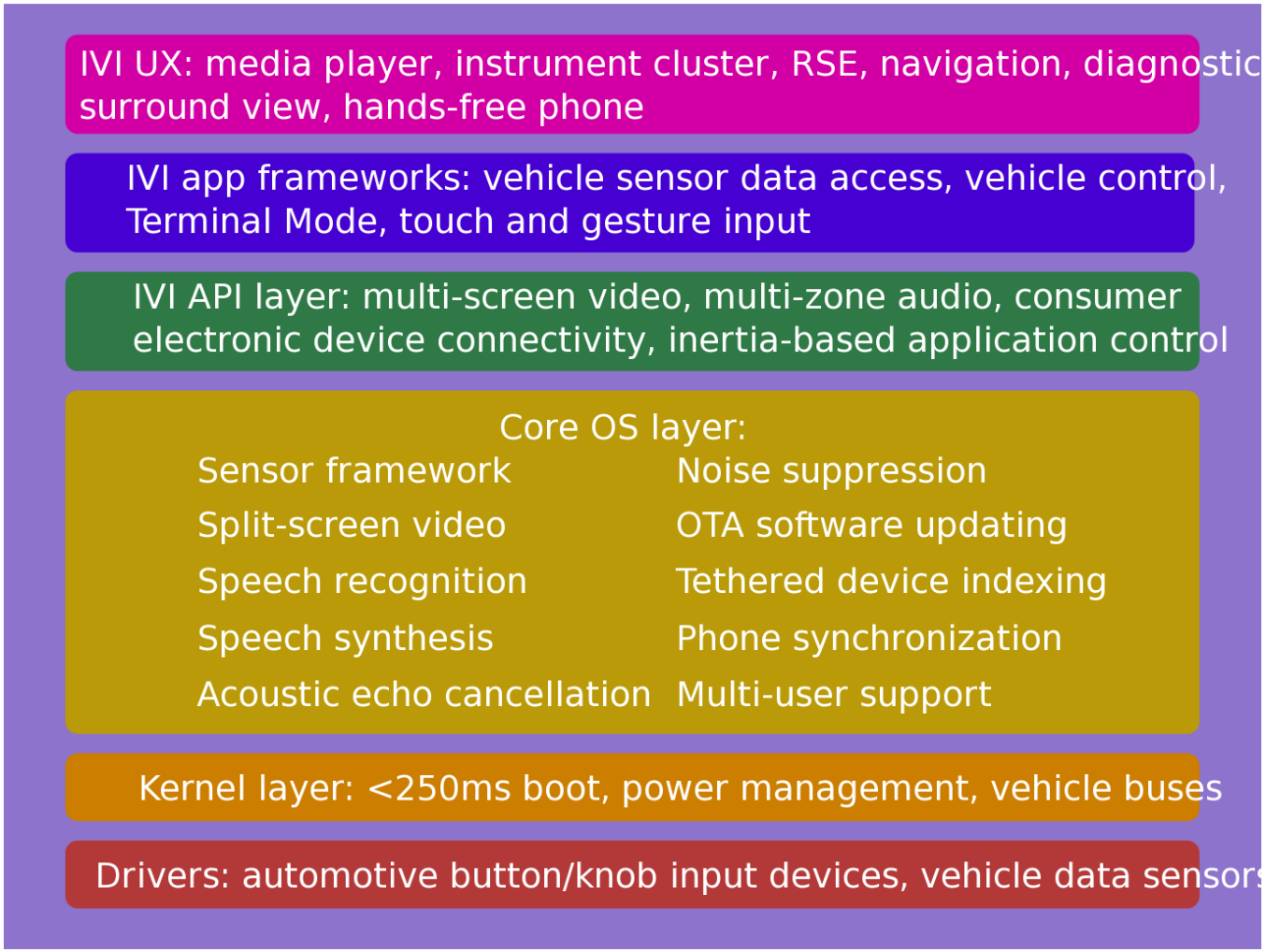
Why consider MeeGo? (or Tizen)?



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

Closer to traditional GNU/Linux distro than Android.

IVI UX Additional Features



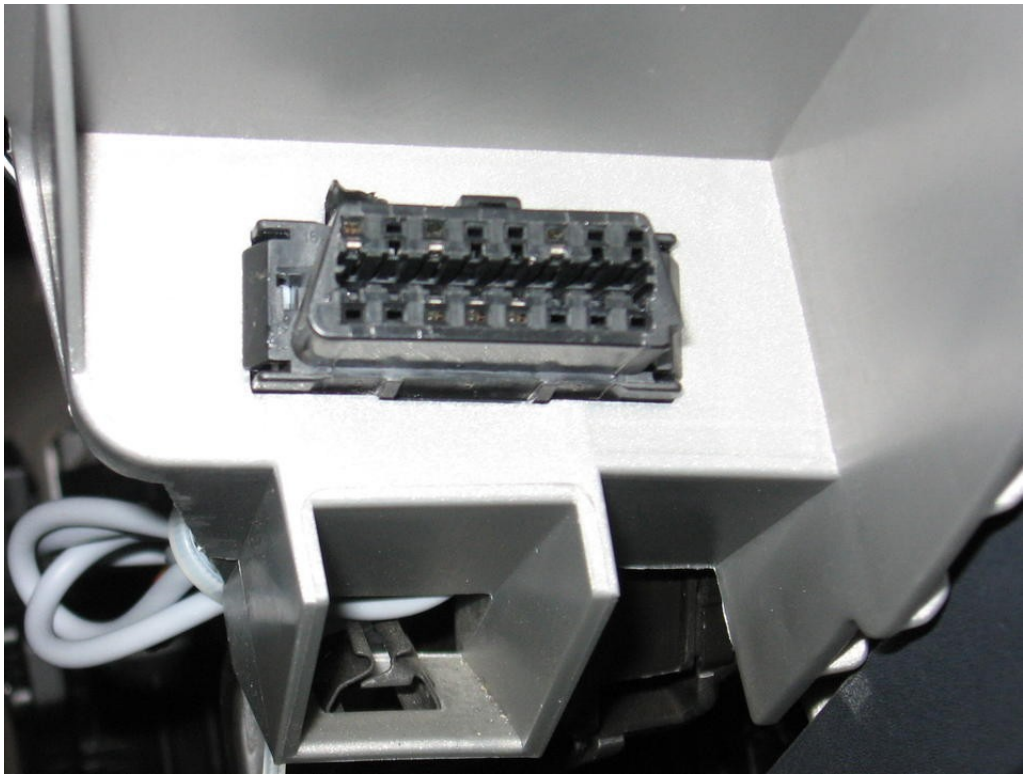
Courtesy
Nathan P. Willis,
http://tinyurl.com/3m4loer

Many automotive players, few public announcements.

MeeGo IVI 1.2 Home Screen

Intended to be reskinned, not as a shipping product.

Example: tripzero's nobdy OBDII/CAN scanner



GFDL

OBD-II connector on left of steering wheel

Scan tool (USB to OBDII) available from Amazon, etc. about $35

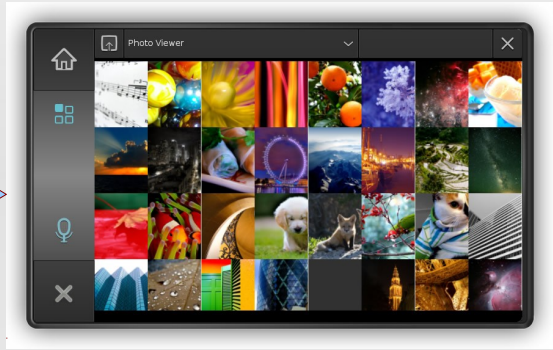
Tripzero: How do I test this in my car?

- Elm-compatible scantool
- Any tablet/smartphone/laptop that runs meego

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

Tripzero: Handset/Tablet + meego ivi

In the near future...



DBus

nobdy

Bluetooth subscriber plugin

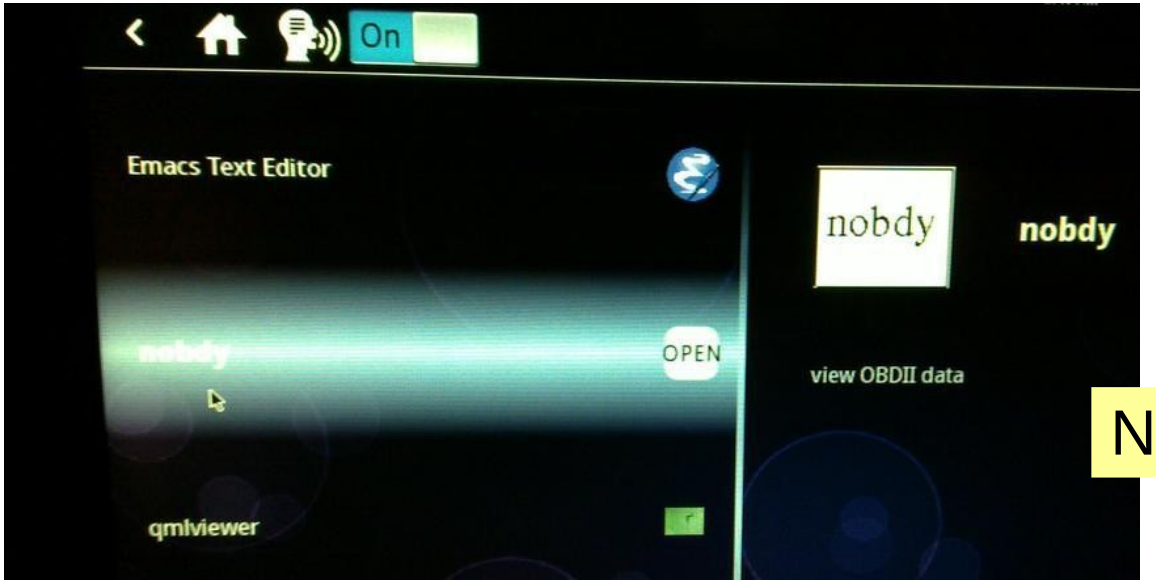
Bluetooth Provider plugin

nobdy

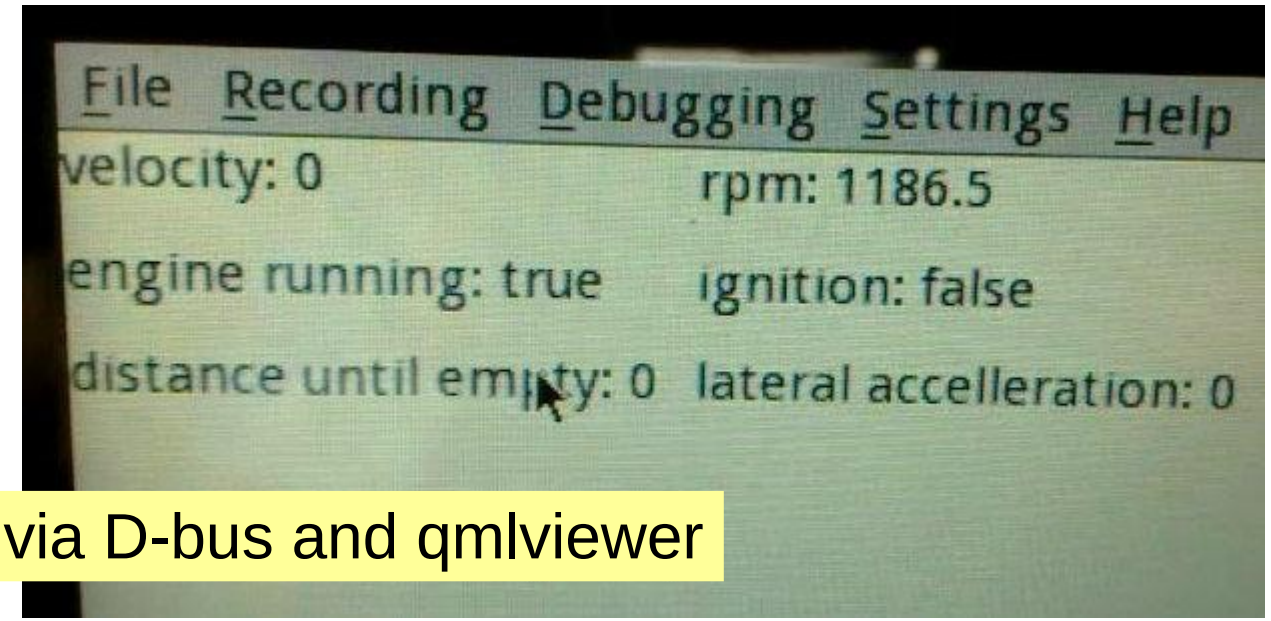
DBus

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

Nobdy on ExoPC



Nobdy in scrollwheel menu



Live data stream via D-bus and qmlviewer

Goal for nOBDy

Open-source ICS IVI demo by Justin Noel

Summary

- Linux opportunities at all levels: HW, accessories, embedded, platform, apps, entrepreneurs and big companies.
- Finding HW for development remains a problem.
- *Many* local companies are participating =>> *jobs*.
- Prediction: automotive is where Linux will show most growth.

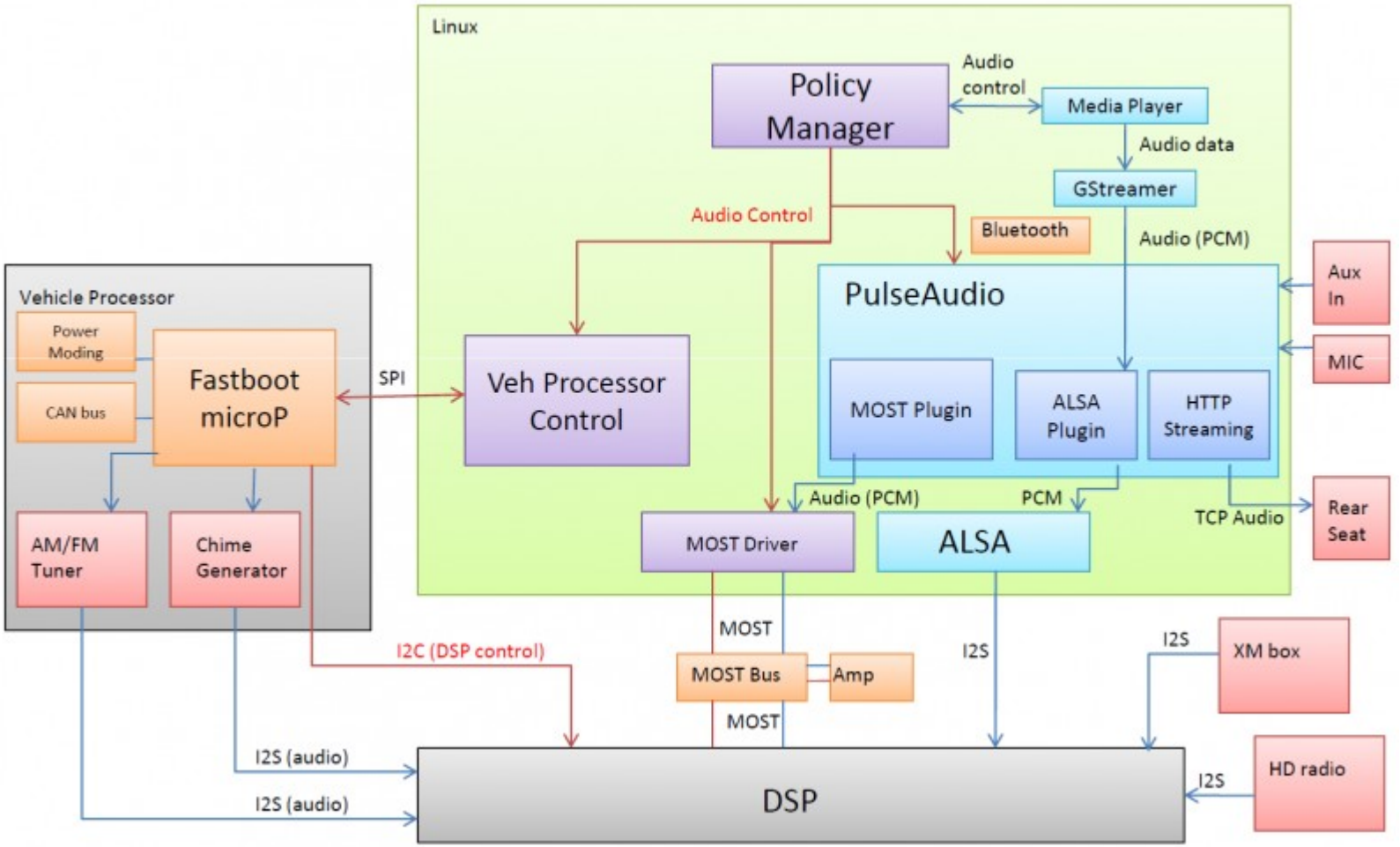
Resources 1: Hardware platforms for IVI

- 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

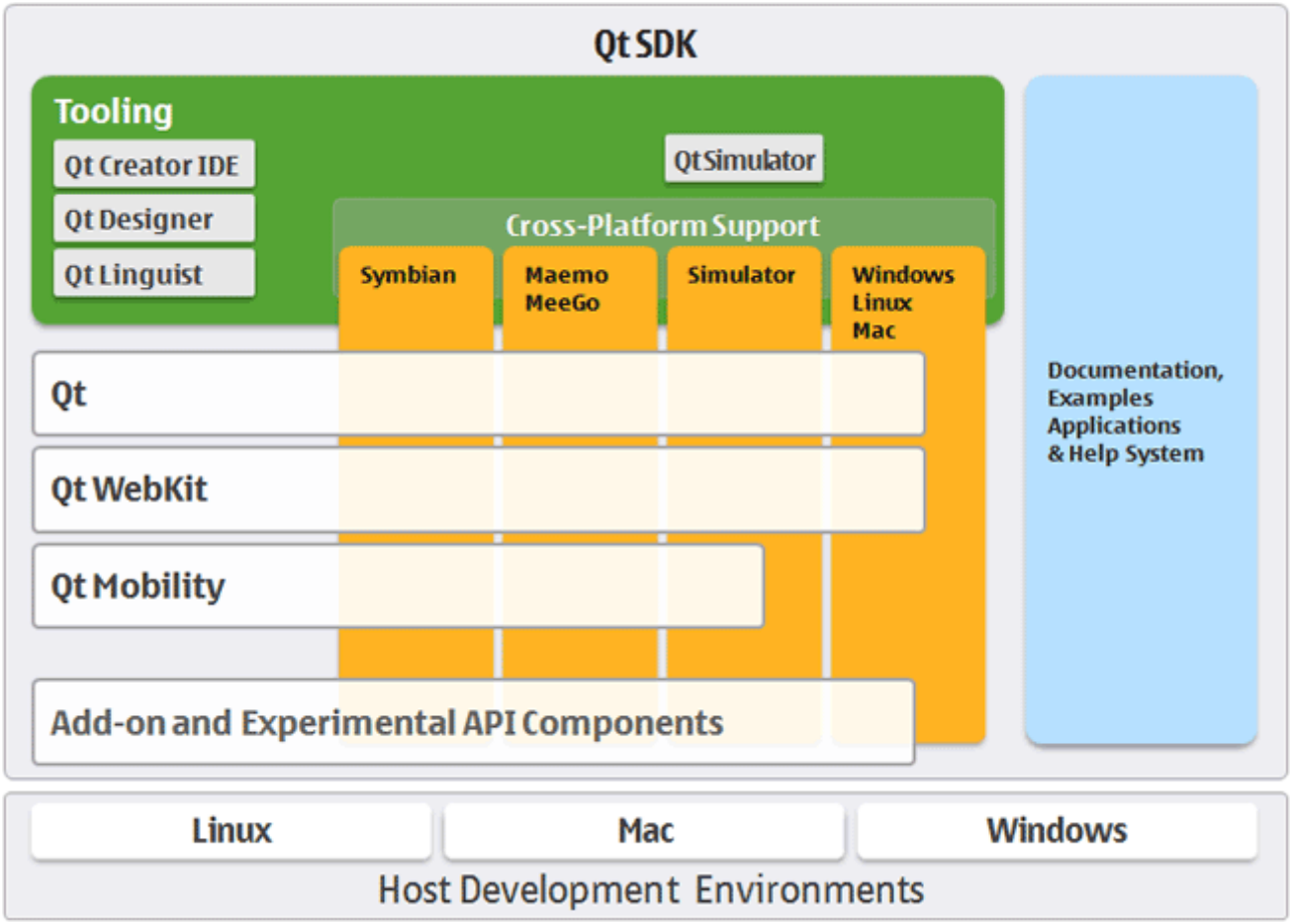
- IVI wiki: http://wiki.meego.com/In-vehicle
- Official site: http://meego.com/downloads/releases/1.2/meego-v1.2-in-vehicle-infotainment-ivi
- Mailing list archive: http://lists.meego.com/pipermail/meego-ivi
- Mp3car.com
- #linuxice and #meego-ivi IRC on freenode.net
- nOBDy: wiki.openice.org/index.php?title=Nobdy
- 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 IVI Audio Architecture



Courtesy Laci Jalics, Delphi.

How about MeeGo?



MeeGo = lightweight GNU/Linux with a Qt face.

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 graphics driver.

MeeGo Hardware Adaptation Process