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

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...

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”? 

![Image of people in a car with in-vehicle infotainment]

What “infotainment” calls to mind

What IVI could be

Courtesy Tata Consultancy Services
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
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
Challenge 1: security

Backseat kids changing nav system's destination . . .
mechanic at body shop installs malware.
Challenge 2: safety

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

Prevent entertainment system from hogging resources (incl. Driver!).
Challenge 3: HW needs

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

Not just RT audio, but RT video too!
Game-like Controls, Real Cars?

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

Maybe what we want is Android . . .

from the Open *Handset* Alliance?
Why consider MeeGo? (or Tizen)?

Closer to traditional GNU/Linux distro than Android.
IVI UX Additional Features

<table>
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<tr>
<th>IVI UX: media player, instrument cluster, RSE, navigation, diagnostic surround view, hands-free phone</th>
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<tr>
<td>IVI app frameworks: vehicle sensor data access, vehicle control, Terminal Mode, touch and gesture input</td>
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<tr>
<td>IVI API layer: multi-screen video, multi-zone audio, consumer electronic device connectivity, inertia-based application control</td>
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<th>Core OS layer:</th>
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<td>Sensor framework</td>
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<td>Split-screen video</td>
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<td>Speech recognition</td>
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<td>Speech synthesis</td>
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<td>Acoustic echo cancellation</td>
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<th>Kernel layer: &lt;250ms boot, power management, vehicle buses</th>
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<td>Drivers: automotive button/knob input devices, vehicle data sensors</td>
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Many automotive players, few public announcements.
MeeGo IVI 1.2 Home Screen

Intended to be reskinned, not as a shipping product.
Problem: what HW platform should IVI devs use?

- 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.
- 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 . . .
Example: tripzero's nobdy OBDII/CAN scanner

OBD-II connector on left of steering wheel

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

GFDL
Tripzero: Handset/Tablet + meego ivi

In the near future...

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

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

- 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 OS fading fast? Intel says it's 'still committed'

By: Brooke Crothers
SEPTEMBER 1, 2011 10:45 PM PDT

An Asia-based report surfaced today that claims Intel will temporarily halt development of its MeeGo operating system for tablets and smartphones due to lack of interest. Intel, however, says it's still committed.

The DigiTimes report claimed that Intel plans to “temporarily discontinue development of its MeeGo OS due to a lack of enthusiasm for the platform from handset and tablet PC vendors.”

MeeGo hasn’t been ignored completely, however. It is also an operating system for the so-called embedded market, such as in-car devices and industrial equipment, where it is doing relatively well, according to Intel. So, MeeGo may be sticking around but don’t expect to pick up a consumer device at your local electronics retailer running the software.
MeeGo Hardware Adaptation Process

Update from wrong repo

Hand-craft extlinux.conf

Use installer defaults

Maybe not that kernel

Multi-hour “zypper up”