Automotive Grade Linux System Architecture Team Meeting

Walt Miner, Engineering Project Manager

June 19, 2018
Agenda

10:00 - 10:15 Introductions and Agenda review
10:15 - 12:00 System Architecture Team
  • Schedule updates for FF and GG
  • AGL Spec Spec Update proposal from Toyota
  • Roadmap review
  • Device Profiles - Telematics and Instrument Cluster
  • EG Updates
12:00 - 13:00 Window Manager and Home Screen
13:00 - 14:00 Lunch
14:00 - 15:00 Web App Framework
15:00 - 16:00 Audio
16:00 - 17:00 - Speech EG
Top 25 Git Committers in 2018

<table>
<thead>
<tr>
<th>Commits</th>
<th>Name</th>
<th>Company</th>
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<tbody>
<tr>
<td>141</td>
<td>Jose Bollo</td>
<td>IoT.bzh</td>
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<tr>
<td>76</td>
<td>Matt Ranostay</td>
<td>Konsulko</td>
</tr>
<tr>
<td>71</td>
<td>Changhyeok Bae</td>
<td>LG</td>
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<td>68</td>
<td>Romain Forlot</td>
<td>IoT.bzh</td>
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<td>67</td>
<td>Khang Nguyen</td>
<td>Renesas</td>
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<td>51</td>
<td>Ronan Le Martret</td>
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<td>39</td>
<td>Thuy Tran</td>
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<td>31</td>
<td>Jan-Simon Moeller</td>
<td>Linux Foundation</td>
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<td>Kazumasa Mitsunari</td>
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<td>Martin Kelly</td>
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796 Total Commits
47 Committers
19 Companies

- 01 Jan 2018 – 14 June 2018
- Commits to master
## Commits by Company in 2018

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<th>Company</th>
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<td>Microchip</td>
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<td>Xevo</td>
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<td>Virtual Open Systems</td>
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</table>

796 Total Commits  
47 Committers  
19 Companies  

- 01 Jan 2018 – 14 June 2018  
- Commits to master
Other Numbers

- 137 commits to eel release branch in 2018
- 5 commits to dab release branch in 2018
- 101 unique individuals and 36 unique companies have contributed to AGL since the start of the project
  - 11 New committers in 2018
- 11 individuals not affiliated with a member company have contributed
- 192 Jira issues closed during 2018
  - 1082 issues closed since start of project
Vision for 2018

- Major Content Providers Develop AGL Apps
- Support for Developers to Port Legacy Apps to AGL
- Releases: Funky Flounder July 2018 and Grumpy Guppy January 2019
- AGL App Framework Evolution
  - User Management
  - Power Management
  - Memory and CPU management
- Sustainable Audio Solution
- Video Player Reference App
- Home Screen and Window Manager Services Complete
- Chromium based HTML5 Apps
- Vehicle to Cloud Services
- Speech and Text to Speech Services
- Reference Hardware System Architecture
- Expanded AGL Automated Test Suite
2018 F2F Workshops

- Feb 19-21 – AGL AMM – Tokyo
- Apr 12-13 – Karlsruhe, Germany (Microchip)
- June 5-8 – Lorient, France (IoT.bzh)
- June 19 – Day before Automotive Linux Summit - Tokyo
- Sep 11-13 – Santa Clara (LG Office)
- October 15-18 - Fall AMM – Dresden, Germany
- Nov 6-8 – CES Integration Session – Yokohama
- Dec 4-6 – CES Integration Session – Yokohama
DARING DAB
Daring Dab Patch Releases

<table>
<thead>
<tr>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
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</table>

Daring Dab

Stabilize

Patch Updates

App Development

Final Release 7.28

4.0.1 9.18 4.0.2 10.15 4.0.3 2.14 4.0.4 ?

https://wiki.automotivelinux.org/agl-distro/release-notes#daring_dab
ELECTRIC EEL
Electric Eel

- Yocto 2.3 – Pyro branch
- Window Manager updates
- Home Screen as an app
- SDK improvements (XDS support for apps)
- App Repository available to download pre-built binaries
- Audio Manager architecture
  - High Level API Service Binder via AGL Advanced Audio Agent (4a)
  - UNICENS binder for ethernet, audio, and video
  - HALs available for UNICENS, USB Audio, Intel, Renesas
Electric Eel

- New BSPs
  - Renesas R-Car M3
  - Intel Compute Card and UpSquared board
- Identity Agent with Cloud Identity
  - Secure Application Data per user
  - Local Identity persistence
  - OpenID Connect
  - NFC and Bluetooth token
- Vehicle Messaging and Signaling
  - Virtual Signal Composer
  - Improved CAN performance
  - Permissions enforced for accessing CAN signals
Electric Eel

New Features Developed

Stabilize

Patch Updates

Start of Development
7.10

RC1 10.22
RC2 11.05
RC3 11.30
RC4 12.10
RC5 12.22
5.0.0 1.10

https://wiki.automotivelinux.org/agl-distro/release-notes#electric_eel
Electric Eel Patch Releases

Electric Eel

Patch Updates

App Development

5.0.0
5.0.1
5.0.2
5.0.3
5.0.4
Release
01.10
2.14
4.4
5.29
07.15

https://wiki.automotivelinux.org/agl-distro/release-notes#electric_eel
FUNKY FLOUNDER
Funky Flounder

New Features Developed
Stabilize
Patch Updates
App Development

Start of Development 1.15

https://wiki.automotivelinux.org/agl-distro/release-notes#electric_eel
Funky Flounder Results

- Yocto 2.4 – Rocko branch - Done
- Device Profiles
  - Build system and profiles changes completed
  - Core AGL Service layer available
  - Need someone to take ownership of Telematics and Instrument Cluster
Funky Flounder Results

- App Framework
  - API V3 including binder discovery and dynamic API extensions completed
  - HTML5 App Management – LGE completed a demo of Web OSe Web App Manager running on AGL App FW. Need plan to incorporate into AGL git.
  - Change to run as non-root – Deferred to Grumpy Guppy
- AGL SDK for App Developers
  - XDS support improvements – V2.0 Ready
  - Improved debug and monitoring capabilities – Ready
Funky Flounder Results

- Graphics and Window Manager
  - Window Manager and Home Screen Stalled due to uncertainty over ownership and lack of resources
  - Pop-Ups and Focus Management
  - Transition Animation
  - Hardware Plane Management
  - Secondary Display Support – Waltham added to AGL. Still in review.
Funky Flounder Results

- Audio Refinements
  - Demonstrating improvements during ALS on EE.
  - Still not good enough for production systems.

- Connectivity Improvements
  - Bluetooth and Wifi improved stability
  - General Networking improvements
  - Bluetooth PBAB and Contacts App Available
  - Vehicle Signaling updated to include dynamic signal creation
Funky Flounder Results

- Continuous Integration and Test
  - Generic binder and application unit testing
  - Four binders made available
  - Code Coverage of test procedure
GRUMPY GUPPY
Grumpy Guppy

• Stay on Yocto 2.4 – Rocko branch
  • Semis aligning on rocko
  • Less churn at start of dev cycle
  • Focus on new features for CES rather than BSPs
• Speech Services Integrated
  • Speech Rec and TTS binders
  • Speech enablement in App Framework
  • Speech Enabled Apps for CES 2019
• Vehicle to Cloud
Grumpy Guppy

- Production Ready Audio Solution
- Introduce Application Lifecycle Model
  - Management of applications as resources are depleted.
  - Standard methods for launch and kill of AGL apps
  - Foreground and background app notifications
  - Event notifications to apps to manage system states
  - Plan to migrate Window Manager and Home Screen to Application Lifecycle Model in HH.
Active Expert Groups

- Application Framework and Security
- Connectivity
- Continuous Integration and Automated Test
- Graphics and UI
- Navigation
- Virtualization
- Reference Hardware System Architecture
- Speech
- Vehicle to Cloud
App Framework and Security EG

- Application lifecycle (install, run, remove, applications)
- SDK and application developer experience both in security and APIs
- Security framework, policies, and strategy for the distribution
- Network and vehicle firewalls in conjunction with the Connectivity EG
- Software Update and secure update
- Diagnostic log and trace
- Secure boot

https://wiki.automotivelinux.org/eg-app-fw
App Framework Accomplishments

- AGL App Framework Available
- AGL Reference Apps available for both Qt5
- APIs available as App FW Service Binders
- SDK with XDS Available
  - App Templates and developer guide
  - Widget creation
  - Service Binders with developer guide
App Framework Accomplishments

- Security Blueprint Revision Published
- API V3
  - Dynamic API creation
  - Service Binder Discovery
App Framework Tasks

- Change to run as non-root/ Multi-user
- Improved debug capabilities
- Speech Enablement
- HTML5 App Management
  - XDG Launcher
  - App Updates
  - Privacy and Security
- Security workflow for Device and App developers
Connectivity EG

• **Vehicle Connectivity (CAN, MOST, LIN)**
• **Network and vehicle firewalls**
• **Bluetooth, Wifi, NFC**
• **Smart Device Link (SDL)**

[https://wiki.automotivelinux.org/eg-connectivity](https://wiki.automotivelinux.org/eg-connectivity)
Connectivity Accomplishments

• Bluetooth
  • Existing binders refactored for improved stability and responsiveness
  • PBAB binder available
• Wifi binder refactored
• Telephony binder new features
• Vehicle messaging
  • Signal composer stabilization and improvements
  • API to define new virtual messages at run-time
Connectivity Task List

• Network management binding
  • Connman improvements or replacement
  • IPv4/v6 configuration
  • Network Bridging, Tethering, QOS and switching
  • User profiles to allow authorized users to configure interfacing
  • Support multiple low-level interface binding backends including Ethernet, WiFi, BT PAN, and WWAN
Connectivity Task List

• Signal composer stabilization and improvements
  • Ready to Extend beyond CAN
  • Factory programming of CAN message set based on final vehicle configuration
Connectivity Task List

- Bluetooth
  - PBAP binder and Contacts App
- Wifi binder
  - AP Mode
  - Additional Wifi hardware support
- Telephony binder
  - Extend to hardwired telephone use case
- NFC binder and NFC for user identification
CI and Automated Test EG

- *Build and smoke test of Gerrit submissions on all hardware*
- *Daily snapshot build and testing*
- *Device tests on real hardware*
- *Test environments such as JTA and Lava*
- Test suites such as LTP
- UI testing (OpenQA)

https://wiki.automotivelinux.org/eg-ciat
CIAT Accomplishments

• Gerrit – Jenkins – Lava workflow improvements
• Web interface for test results
• “Lab in a Box” portable test environment
• Lab in a Box and test case creation training
• New reference boards added to Lava and Jenkins
• CI system builds and checks for optional features when testing patches
CIAT Task List

- Lab in a box
  - Board management
  - Board on developer's desk
- Improved web interface for test results
- Additional tests
  - Applications
  - Platform
  - BSPs
- Fuego integration
- Static code analysis tools
UI and Graphics EG

- **AGL Compositor, Layer Manager, Window Manager and GPU interface**
- **Multimedia video manager (including multi-display and display sharing) and audio manager**, and media manager/player.
- **Browser Engine**
- **Speech Recognition**

https://wiki.automotivelinux.org/eg-ui-graphics
Graphics and UI Accomplishments

- Update to Wayland 2.0
- Refactored Home Screen including splitting out Window Manager
- XDG Launcher started
- Internode display protocol
  - Control IC display output from navi running on IVI system
  - Waltham
- Support for Chromium browser engine
Graphics and UI Accomplishments

- Improved Audio management configuration and policies
  - High Level audio API
  - AGL Advanced Audio Agent (AAAA)
  - UNICENS binder
  - HALs available for UNICENS, USB audio, Renesas and Intel on-board audio
Graphics and UI Tasks

- Investigate replacement for Qt; HTML5, GTK+, etc.
  - LG involvement
- Finish Window Manager and Homescreen work
  - Pop-up support and interactive user response
  - Focus management for out of focus apps
  - Improved secondary display support
  - Transition Animation
  - Hardware plane management
- Upstream to Wayland/Weston
- XDG protocol
- Waltham protocol for internode display
Graphics and UI Tasks

• Audio
  • Complete AGL Advanced Audio Agent (AAAA)
  • Make PulseAudio optional
  • Switch to Bluez / Alsa for Bluetooth audio
  • Speech and Text to Speech Services collaboration
  • Policy management between mic input and Media player output
Navigation EG

- Navigation API
- Location Based Services API
- Reference Navigation and POI apps
- Speech recognition integration

https://wiki.automotivelinux.org/eg-navi
Navigation Accomplishments

- Navigation and POI reference Apps
- GPS, Geofence binder available
Navigation Task List

- Navigation API 1.0 fully implemented
- GPS binder available
- Map creation process
- New Navi app from Comtech
Virtualization EG

• Hypervisor/ LXC
• Looking at Xen, Jailhouse, and others

https://wiki.automotivelinux.org/eg-virt
Virtualization Accomplishments

• Automotive Virtualization White Paper Completed
• Several CES demos ran in virtualized environments (Panasonic, Denso, EB, etc.)
Virtualization Task List

- Standard Protocol for communications between VMs
- Resource sharing (e.g. GPU) between VMs
- Extend KVM support beyond Renesas
- Additional open source hypervisors
Reference Hardware System Arch

- Create system architecture to be used across AGL profiles
Speech EG

• Members: Amazon, Nuance, VoiceBox Technologies
• Create a standardized set of speech recognition APIs that app developers can use regardless of underlying speech engine
  • Natural language or grammar tree based
  • On board or cloud based speech
• Text to Speech API
• Amazon and Nuance have open APIs that could be used as a starting point
  • Nuance started on a Speech API Binding that is being reviewed by the team
Speech EG

• Signal processing for noise reduction and echo cancellation
• Grammar development tools
System Architecture Team

- Overall System Architecture
- Yocto
- Build system and Device Profiles
- Cross EG coordination
V2C Expert Group - Objectives

• Refine V2C Use Cases
  • Telematics
  • Personalization
  • Authentication & Authorization
  • Etc.

• Define Reference Architecture
  • Identify existing, missing or reusable components

• Identify reference application(s)
THANK YOU